



DEPARTMENT OF TRANSPORTATION

Pipeline and Hazardous Materials Safety Administration

49 CFR Parts 171, 172, 173, 175, 176, 178, and 180

[Docket No. PHMSA-2019-0030 (HM-215P)]

RIN 2137-AF46

Hazardous Materials: Harmonization with International Standards

AGENCY: Pipeline and Hazardous Materials Safety Administration (PHMSA),
Department of Transportation (DOT).

ACTION: Final rule.

SUMMARY: PHMSA is amending the Hazardous Materials Regulations (HMR) to maintain alignment with international regulations and standards by adopting various amendments, including changes to proper shipping names, hazard classes, packing groups, special provisions, packaging authorizations, air transport quantity limitations, and vessel stowage requirements. Additionally, PHMSA is amending the HMR to allow for better alignment with Transport Canada's Transportation of Dangerous Goods Regulations. PHMSA is also withdrawing the unpublished October 1, 2020, Notice of Enforcement Policy Regarding International Standards on use of select updated international standards in complying with the HMR during the pendency of this rulemaking.

DATES: *Effective date:* This rule is effective [INSERT DATE 30 DAYS AFTER PUBLICATION IN THE FEDERAL REGISTER].

Voluntary compliance date: January 1, 2021.

Delayed compliance date: [INSERT DATE ONE YEAR FROM DATE OF PUBLICATION IN THE FEDERAL REGISTER].

Incorporation by reference date: The incorporation by reference of certain publications listed in this rule is approved by the Director of the Federal Register on [INSERT DATE 30 DAYS AFTER DATE OF PUBLICATION IN THE FEDERAL REGISTER]. The incorporation by reference of certain other publications listed in this rule was approved by the Director of the Federal Register as of May 11, 2020.

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I. Executive Summary

As discussed in further detail in this final rule (*see* the V. Section-by-Section Review of Amendments), the Pipeline and Hazardous Materials Safety Administration (PHMSA) amends certain sections of the Hazardous Materials Regulations (HMR; 49

CFR parts 171 to 180) to maintain alignment with international regulations and standards by adopting various amendments, including changes to proper shipping names, hazard classes, packing groups, special provisions, packaging authorizations, air transport quantity limitations, and vessel stowage requirements. Furthermore, this final rule addresses the 17 sets of comments received in response to the Notice of Proposed Rulemaking (NPRM)¹ published in August 2021. Overall, the comments to the NPRM were generally supportive of the proposals made; however, PHMSA did receive a few comments seeking further clarification or revisions to the NPRM which PHMSA also addresses in this final rule.

PHMSA expects that the adoption of the regulatory amendments in this final rule will facilitate transportation efficiency while maintaining the high safety standard currently achieved under the HMR. For example, the final rule will improve the safe transportation of vaccines and other medical materials associated with the ongoing response to the coronavirus disease 2019 (COVID-19) public health emergency, or any similar public health emergency that may emerge, by removing unnecessary regulatory hurdles to the international movement of those materials. This final rule will also align HMR requirements with anticipated increases in the volume of lithium batteries transported in interstate commerce from electrification of the transportation and other economic sectors. PHMSA also notes that the harmonization of the HMR with international consensus standards could reduce delays and interruptions of hazardous materials during transportation. The amendments may also lower greenhouse gas (GHG) emissions and safety risks to minority, low-income, underserved, and other disadvantaged populations, and communities in the vicinity of interim storage sites and transportation arteries and hubs.

¹ 86 FR 43844 (Aug. 10, 2021).

The following list summarizes the more noteworthy amendments set forth in this final rule:

- *Incorporation by Reference*: PHMSA is incorporating by reference updated versions of the following international hazardous materials regulations and standards: the 2021-2022 Edition of the International Civil Aviation Organization Technical Instructions for the Safe Transport of Dangerous Goods by Air (ICAO Technical Instructions); Amendment 40-20 to the International Maritime Dangerous Goods Code (IMDG Code); the 21st revised edition of the United Nations Recommendations on the Transport of Dangerous Goods – Model Regulations (UN Model Regulations); and the International Atomic Energy Agency (IAEA) “Specific Safety Requirements Number SSR-6: Regulations for the Safe Transport of Radioactive Material 2018 Edition” (SSR-6, Rev.1). PHMSA also incorporates by reference several new or updated International Organization for Standardization (ISO) standards, as well as an updated version of the Organization for Economic Cooperation and Development (OECD) Guidelines for the Testing of Chemicals *Test No. 431: In vitro skin corrosion: reconstructed human epidermis (RHE) test method*.
- *Transport Canada temporary certificates*: PHMSA is amending the HMR to authorize the highway or rail transportation of a hazardous material within the United States pursuant to a temporary certificate issued under Transport Canada’s Transportation of Dangerous Goods Regulations (TDG Regulations).
- *Hazardous Materials Table*: PHMSA is amending the Hazardous Materials Table (HMT; 49 CFR 172.101) to add, revise, or remove certain proper shipping names, hazard classes, packing groups, special provisions, packaging authorizations, bulk packaging requirements, and passenger and cargo aircraft maximum quantity limits.
- *Data loggers*: PHMSA is adopting provisions for lithium batteries in equipment that are attached to or contained in packagings, large packagings, intermediate bulk

containers (IBCs), or cargo transport units as equipment in use or intended for use during transport, such as data loggers. Additionally, in response to the COVID-19 public health emergency and consistent with revisions to the 2021-2022 ICAO Technical Instructions, PHMSA is adding provisions specific to the air transportation of these items used in association with shipments of COVID-19 pharmaceuticals, including vaccines.

- *Removal of metal wall thickness requirements for certain metal IBCs:* PHMSA is removing the minimum wall thickness requirements for metal IBCs that have a capacity of 1500 liters (L) or less.

- *Stabilized fish meal or fish scrap by air:* PHMSA is authorizing the transport of stabilized fish meal or fish scrap (UN2216) on passenger and cargo aircraft.

Currently, when transported as a Class 9 material, stabilized fish meal or fish scrap is only authorized for transportation by vessel. As a part of this amendment, PHMSA is also expanding the applicability of the stabilization requirements currently in place for shipments of these materials by vessel.

- *UN3549 Category A Medical Wastes:* PHMSA is adding an entry to the HMT for “UN3549, Medical Waste, Category A, Affecting Humans, *solid* or Medical Waste, Category A, Affecting Animals *only, solid.*” This entry provides an additional shipping description for solid materials meeting the Category A classification criteria that are not appropriate for classification in existing entries/classes “UN2814, Infectious substances, affecting humans, 6.2” or “UN2900, Infectious substances, affecting animals *only*, 6.2.” Solid medical waste containing Category A infectious substances generated from the medical treatment of humans or veterinary treatment of animals (e.g., disposable personal protective equipment) may be assigned to UN3549. Although PHMSA is not adopting certain packaging provisions adopted in the UN Model Regulations (UNMR), we are assigning Special Provision 131—which directs

shippers to request approval from the Associate Administrator, through a special permit, prior to transportation—to UN3549. Additionally, PHMSA is amending certain parts of § 173.134, which provides definitions and exceptions for Class 6, Division 6.2 hazardous materials, to include references to this new UN number and proper shipping name.

- *Additional packagings for “UN2211, Polymeric beads, expandable, evolving flammable vapor” and “UN3314, Plastic molding compound in dough, sheet or extruded rope form evolving flammable vapor”*: PHMSA is expanding the authorized packagings for polymeric beads and plastic molding compound to include combination packagings rather than limiting packaging options to single packagings.
- *Miscellaneous revisions of requirements pertaining to the transportation of lithium batteries*: PHMSA is amending several provisions, including, but not limited to, minimum size markings and modification of stowage requirements for lithium batteries including those offered as damaged/defective or for disposal/recycling. PHMSA expects the revisions will contribute to the safe transportation of increased volumes of lithium batteries anticipated as a result of the increased use of that technology in the transportation and other economic sectors.
- *Definition of SADT (Self-accelerating decomposition temperature) and SAPT (Self-accelerating polymerizing temperature)*: PHMSA is amending the definitions of SADT and SAPT to clarify that the lowest temperature at which these chemical reactions may occur in a packaging, IBC, or portable tank.
- *Periodic inspection for chemicals under pressure*: PHMSA is extending the periodic inspection, from five to ten years, for cylinders that are filled with hazardous materials described as “UN3500, Chemicals under pressure, n.o.s.” that are also used as fire extinguishing agents.

- *Technical name requirements for marine pollutants*: PHMSA is amending provisions pertaining to the addition of technical names to the shipping description when transporting hazardous materials that contain marine pollutants. These amendments aim to provide flexibility regarding documentation and marking requirements, which currently require identifying the technical names of marine pollutant components in those materials. Additionally, PHMSA is amending §§ 172.203(l) and 172.322 to limit the applicability of requirements for specific marine pollutant constituents for generic entries (indicated by the letter “G” in column 1 of the Hazardous Materials Table) and those containing “n.o.s.” as part of the proper shipping names.
- *Stability tests for nitrocellulose*: PHMSA is adding stability testing requirements for nitrocellulose to require that these materials meet the criteria of the Bergmann-Junk test or methyl violet paper test in the UN Manual of Tests and Criteria, Appendix 10.

Some of the amendments represent clear improvements in safety, such as nitrocellulose stability testing, additional closures for packagings intended for pyrophoric materials, and on deck stowage requirements for lithium batteries transported by vessel for disposal, recycling, or those that are damaged or defective. Furthermore, all of the amendments are expected to maintain the HMR’s high safety standard for the public and the environment. Additionally, PHMSA anticipates that there are safety benefits to be derived from improved compliance related to consistency amongst domestic and international regulations.

Finally, as further explained in the Regulatory Impact Analysis (RIA), PHMSA calculates that the aggregate benefits of the amendments in this final rule more than justify their aggregate costs. In fact, PHMSA estimates that the annualized quantified net cost savings of this rulemaking, using a 7 percent discount rate, are approximately \$24.5 to \$28.3 million per year.

II. Background

The Federal hazardous materials transportation law (49 U.S.C. 5101 *et seq.*) directs PHMSA to participate in relevant international standard-setting bodies and encourages alignment of the HMR with international transport standards consistent with the promotion of safety and the public interest. *See* 49 U.S.C. 5120. This statutory mandate reflects the importance of international standard-setting activity considering the globalization of commercial transportation of hazardous materials. Harmonization of the HMR with those efforts can reduce the costs and other burdens of complying with multiple or inconsistent safety requirements between nations. Consistency between the HMR and current international standards can also enhance safety by: (1) ensuring that the HMR is informed by the latest best practices and lessons learned; (2) improving the understanding of—and compliance with—pertinent requirements; (3) facilitating the smooth flow of hazardous materials from their points of origin to their points of destination, thereby avoiding risks to the public and the environment from release of hazardous materials from delays or interruptions in the transportation of those materials; and (4) enabling consistent emergency response procedures in the event of a hazardous materials incident.

PHMSA participates in the development of international regulations and standards for the transportation of hazardous materials. It also adopts within the HMR international standards consistent with PHMSA's safety mission. PHMSA reviews and evaluates each international standard it considers for incorporation within the HMR on its own merits, to include the effects on transportation safety, the environmental impacts, and any economic impacts. PHMSA's goal is to harmonize with international standards without diminishing the level of safety currently provided by the HMR or imposing undue burdens on the regulated community.

In a final rule published December 21, 1990,² PHMSA's predecessor—the Research and Special Programs Administration (RSPA)—comprehensively revised the HMR for greater consistency with the UNMR. The UNMR constitute a set of recommendations issued by the United Nations Committee of Experts (UNSCOE) on the Transport of Dangerous Goods and on the Globally Harmonized System of Classification and Labelling of Chemicals (GHS). The UNMR are amended and updated biennially by the UNSCOE and serve as the basis for national, regional, and international modal regulations, including the ICAO Technical Instructions and IMDG Code.

PHMSA has evaluated recent updates to the international standards and is revising the HMR to adopt changes consistent with revisions to the 2021-2022 Edition of the ICAO Technical Instructions, Amendment 40-20 to the IMDG Code,³ and the 21st revised edition of the UNMR, all of which were published by or in effect on January 1, 2021. PHMSA issued a Notice of Enforcement Policy Regarding International Standards⁴ on October 1, 2020, stating that while PHMSA is considering the 2021-2022 Edition of the ICAO Technical Instructions and Amendment 40-20 to the IMDG Code for potential adoption into the HMR, PHMSA and other Federal agencies that enforce the HMR—e.g., the Federal Railroad Administration, the Federal Aviation Administration (FAA), the Federal Motor Carrier Safety Administration, and the United States Coast Guard—will not take enforcement action against any offeror or carrier who uses these standards as an alternative to complying with current HMR requirements when all or part of the transportation is by air with respect to the ICAO Technical Instructions, or by vessel with respect to the IMDG Code. In addition, that Notice stated PHMSA, and its modal

² 55 FR 52401 (Dec. 21, 1990).

³ Amendment 40-20 to the IMDG Code may be voluntarily complied with as of January 1, 2021; however, Amendment 39-18 will remain effective through May 31, 2022.

⁴ PHMSA, Notice of Enforcement Policy Regarding International Standards (Oct. 1, 2020), <https://www.phmsa.dot.gov/sites/phmsa.dot.gov/files/2020-10/Notice%20of%20Enforcement%20Policy%20Regarding%20International%20Standards%20Oct%201%202020.pdf>.

partners will not take enforcement action against any offeror or carrier who offers or accepts for domestic or international transportation by any mode packages marked or labeled in accordance with these standards. PHMSA withdraws its October 1, 2020, Notice of Enforcement Policy Regarding International Standards as of the effective date of this final rule. Additionally, in response to the ongoing global COVID-19 public health emergency, on December 31, 2020, and February 23, 2021, ICAO published addenda to the 2021-2022 Edition of the ICAO Technical Instructions to provide additional provisions and exceptions to reduce regulatory compliance burdens for the transport of certain hazardous materials, such as alcohols and aerosols used for hygienic purposes, by air. PHMSA is including those changes to international standards in this final rule. Finally, PHMSA is incorporating by reference these new international regulations and standards as well as new requirements from the IAEA, “Specific Safety Requirements Number SSR-6: Regulations for the Safe Transport of Radioactive Material 2018 Edition” (SSR-6, Rev.1); several new or updated ISO standards; and an updated version of the OECD Guidelines for the Testing of Chemicals *Test No. 431: In vitro skin corrosion: reconstructed human epidermis (RHE) test method*. The standards incorporated by reference are authorized for use for domestic transportation, under specific conditions, by part 171, subpart C of the HMR.

During PHMSA’s development of the final rule, the President issued a series of Executive Orders coordinating the Federal response to the COVID-19 public health emergency—a handful of those are pertinent to this final rule. Specifically, section 2 of Executive Order 13987 (“Organizing and Mobilizing the United States Government to Provide a Unified and Effective Response to Combat COVID-19 and To Provide United States Leadership on Global Health and Security”)⁵ contemplates broad-based action across the Federal Government to “produce, supply, and distribute personal protective

⁵ 86 FR 7019 (Jan. 20, 2021).

equipment, vaccines, tests, and other supplies for the Nation’s COVID-19 response.” Similarly, Executive Order 14002 (“Economic Relief Related to COVID-19 Pandemic”)⁶ directs Federal agencies like PHMSA to respond to the economic harm caused by the COVID-19 public health emergency by promptly identifying actions they can take within existing authorities to provide economic relief to affected persons and businesses. Lastly, the President has announced ambitious reductions in national GHG emissions to combat climate change, identifying electrification of the transportation and other economic sectors—to include enabling more widespread use of electric storage technologies, such as lithium batteries—as a critical element of that effort.⁷

III. Incorporation by Reference Discussion Under 1 CFR Part 51

According to the Office of Management and Budget (OMB), Circular A-119, “Federal Participation in the Development and Use of Voluntary Consensus Standards and in Conformity Assessment Activities,” government agencies must use voluntary consensus standards wherever practical in the development of regulations.

PHMSA currently incorporates by reference into the HMR all or parts of several standards and specifications developed and published by standard development organizations (SDOs). In general, SDOs update and revise their published standards every two to five years to reflect modern technology and best technical practices. The National Technology Transfer and Advancement Act of 1995 (NTTAA; Pub. L. 104–113) directs Federal agencies to use standards developed by voluntary consensus standards bodies in lieu of government-written standards whenever possible. Voluntary consensus standards bodies develop, establish, or coordinate technical standards using

⁶ 86 FR 7229 (Jan. 21, 2021).

⁷ See, e.g., White House, “Fact Sheet: President Biden Sets 2030 Greenhouse Gas Pollution Reduction Target Aimed at Creating Good-Paying Union Jobs and Securing U.S. Leadership on Clean Energy Technologies” (Apr. 21, 2021), <https://www.whitehouse.gov/briefing-room/statements-releases/2021/04/22/fact-sheet-president-biden-sets-2030-greenhouse-gas-pollution-reduction-target-aimed-at-creating-good-paying-union-jobs-and-securing-u-s-leadership-on-clean-energy-technologies/>.

agreed-upon procedures. OMB issued Circular A-119 to implement section 12(d) of the NTTAA relative to the utilization of consensus technical standards by Federal agencies. This circular provides guidance for agencies participating in voluntary consensus standards bodies and describes procedures for satisfying the reporting requirements in the NTTAA. Accordingly, PHMSA is responsible for determining which currently referenced standards should be updated, revised, or removed, and which standards should be added to the HMR. Revisions to materials incorporated by reference in the HMR are handled via the rulemaking process, which allows for the public and regulated entities to provide input.

The UNMR, the UN Manual of Tests and Criteria, the IAEA Regulations for the Safe Transport of Radioactive Material, and the OECD Guidelines for the Testing of Chemicals *Test No. 431: In vitro skin corrosion: reconstructed human epidermis (RHE) test method* are free and easily accessible to the public on the internet, with access provided through the parent organization websites. The ICAO Technical Instructions, IMDG Code, and all ISO standard references are available for interested parties to purchase in either print or electronic versions through the parent organization websites. The price charged for those standards not freely available helps to cover the cost of developing, maintaining, hosting, and accessing these standards. The specific standards are discussed in greater detail in “V. Section-by-Section Review of Amendments Section” of this document.

IV. Comment Discussion

In response to the NPRM, PHMSA received 17 sets of comments⁸ from the following persons:

- Airbus

⁸ <https://www.regulations.gov/docket/PHMSA-2019-0030/comments>

- Amazon
- Anonymous
- Council on the Safe Transportation of Hazardous Articles (COSTHA)
- Dangerous Goods Advisory Council (DGAC)
- Dow Chemical Company (Dow)
- Elanore Tessitore
- Healthcare Waste Institute (HWI)
- Institute for the Makers of Explosives (IME)
- Luxfer Canada
- Luxfer Gas Cylinders
- Medical Device Transport Council (MDTC)
- The Rechargeable Battery Association (PRBA)
- Reggie Valentine
- Rigid Intermediate Bulk Container Association (RIBCA)
- Reusable Industrial Packaging Association (RIPA)
- Stericycle

PHMSA received comments from Amazon, DGAC, COSTHA, MDTC, and PRBA, all providing general support for harmonization with international standards with additional support from Luxfer Gas Cylinders for the incorporation by reference of the ISO standards applicable to cylinders. In addition, PHMSA received a comment from IME encouraging expeditious adoption of changes to international regulations into the HMR.

Comments concerning the sunset provisions for polymerizing substances, damaged or defective batteries, and comments outside the scope of this rulemaking are discussed below. All other comments specific to proposed changes to HMR sections are addressed in the “V. Section-by-Section Review of Amendments” of this document.

A. Comments Outside the Scope of this Rulemaking

PHMSA received a comment from an anonymous person noting that PHMSA did not propose to update the publications referenced in § 173.58(c). This section addresses the assignment of Class and Divisions for new explosives and paragraph (c) specifically addresses classification of Division 1.6 explosives. The anonymous commenter states the provisions of § 173.58(c) are outdated relative to the 21st revised edition of the UNMR and the UN Manual of Tests and Criteria 7th revised edition. The anonymous commenter suggests that PHMSA review and amend § 173.58(c) to maintain alignment with international regulations. Specifically, the commenter notes that the UN provisions (as outlined in the UN Manual of Test and Criteria) currently specify that explosive substances in Division 1.6 articles must be “predominantly containing an extremely insensitive substance” and must no longer be “exclusively containing an extremely insensitive substance” as currently cited in § 173.58(c). Additionally, the commenter adds that a Division 1.6 article fragment impact test has been added to the UN provisions (as outlined in the UN Manual of Test and Criteria) for Division 1.6 articles and that test is not cited within § 173.58(c).

PHMSA acknowledges the commenter’s concerns over the testing requirements for Division 1.6 explosives in § 173.58(c). However, PHMSA did not propose changes to this section in the NPRM and, therefore, declines to make such revisions in this final rule without further evaluation by PHMSA subject matter experts and an opportunity for stakeholders to comment on the issue. If the commenter has a proposal to revise the regulatory text § 173.58(c), PHMSA encourages the commenter to submit a petition for rulemaking in accordance with 49 CFR 106.100 and provide specific justification that the regulatory text at § 173.58(c) must be updated to mirror language in the updated industry standards referenced elsewhere in § 173.58.

In its comments on the NPRM, MDTC noted that PHMSA did not address the inclusion of Special Provision A201—approval of the State of Origin and the operator—and other provisions codified in the HM-224I Interim Final Rule (IFR).⁹ While PHMSA appreciates the comments from MDTC, we are not addressing comments to the HM-224I IFR in this final rule. PHMSA will address and respond to all comments on the HM-224I IFR in a future HM-224I final rule.

B. Polymerizing Substances

Dow and DGAC provided comments on the sunset dates for polymerizing substances as outlined in a previously issued international harmonization final rule, HM-215O.¹⁰ In HM-215O, PHMSA extended the sunset dates to January 2, 2023, for polymerizing substances to allow PHMSA to complete an ongoing research project and analyze all comments and data concerning the issue submitted to the docket for the HM-215O¹¹ NPRM. Dow and DGAC are concerned that the next international harmonization rule will be published after January 2, 2023, resulting in polymerizing substances regulations no longer being in effect for transportation in accordance with the HMR. PHMSA expects to address these concerns regarding sunset dates for transportation of polymerizing substances in a final rule prior to the expiration of the sunset dates.

C. Guidance on Damaged or Defective Batteries

In its comments, MDTC and PRBA requested that PHMSA include a note from Special Provision 376 of the UNMR for determining whether a lithium battery is damaged or defective within the amendments adopted in this final rule. The commenters state this note will better assist shippers on how to evaluate whether a lithium battery is

⁹ 84 FR 8006 (Mar. 6, 2019).

¹⁰ 79 FR 46012 (Aug. 16, 2014).

¹¹ 85 FR 27810 (May. 11, 2020).

considered damaged or defective. PHMSA appreciates MDTC and PRBA bringing this issue to our attention and concurs that more guidance is needed to help in the determination of when a lithium battery is considered damaged or defective. However, the note to Special Provision 376 of the UNMR is guidance and not prescriptive language within that international standard. While PHMSA does not believe it is appropriate to codify the note to Special Provision 376 of the UNMR within the HMR currently, PHMSA acknowledges the value of the Special Provision 376 language in providing guidance on the shipment of damaged or defective batteries. Towards that end, PHMSA has issued a safety advisory notice on the shipment of damaged or defective batteries.¹² Within this safety advisory notice, PHMSA has paraphrased and cited the guidance presented in the note to Special Provision 376 of the UNMR for determining when a battery is damaged or defective. PHMSA encourages the shippers of damaged or defective batteries to review this notice for assistance in the shipment of damaged or defective lithium batteries.

D. Support for PHMSA’s Decision Not to Propose Certain Amendments

DGAC provided comments on revisions in the 21st revised edition of the UNMR that contain packing instructions for several electric battery entries in the UNMR. The 21st revised edition of the UNMR contains amendments to Packing Instruction P801, applicable to used batteries assigned the following UN numbers: “UN2794, Batteries, wet, filled with acid, electric storage;” “UN2795, Batteries, wet, filled with alkali, electric storage;” and “UN3028, Batteries, dry, containing potassium hydroxide solid, electric storage.” These amendments were adopted to correct issues unique to the UNMR pertaining to the required use of stainless-steel boxes and plastic bins as packaging for

¹² See the “Safety Advisory Notice for the Disposal and Recycling of Lithium Batteries in Commercial Transportation” issued on May 17, 2022, at: <https://www.phmsa.dot.gov/news/phmsa-safety-advisory-notice-transportation-lithium-batteries-disposal-or-recycling>

these used batteries. DGAC provided comments in support of PHMSA's decision to not propose adopting these unique packaging requirements into the HMR and concurs with PHMSA's position that there is not a sufficient safety justification to limit the transport of used batteries. DGAC concludes the new provisions to P801 for these batteries would not substantially improve their safe transportation.

V. Section-by-Section Review of Amendments

The following is a section-by-section review of the amendments in this final rule.

A. Part 171

Section 171.7

Section 171.7 provides a listing of all voluntary consensus standards incorporated by reference into the HMR, as directed by the NTTAA. For this rulemaking, PHMSA evaluated updated international consensus standards pertaining to proper shipping names, hazard classes, packing groups, special provisions, packaging authorizations, air transport quantity limitations, and vessel stowage requirements. PHMSA contributed to the development of those updated standards—each of which build on the well-established and documented safety histories of earlier editions—as it participated in the discussions and working group activities associated with their proposal, revision, and approval. Those activities have, in turn, informed PHMSA's evaluation of the effect on safety those updated consensus standards would have when incorporated by reference and their provisions adopted into the HMR. Further, PHMSA notes that some of the consensus standards incorporated by reference within the HMR in this rulemaking have already been adopted into the regulatory schemes of other countries, noting again that PHMSA itself has issued an enforcement discretion authorizing their use as an interim strategy for complying with current HMR requirements. PHMSA is not aware of adverse safety

impacts from that operational experience. For these reasons, PHMSA expects their adoption will maintain the high safety standard currently achieved under the HMR. PHMSA received a comment from DGAC in support of these incorporation by reference revisions. Therefore, PHMSA is adding or revising the following incorporation by reference materials:

- In paragraph (s)(1), incorporate by reference the 2018 edition of the IAEA Regulations for the Safe Transport of Radioactive Material, Safety Standards Series No. SSR-6 (Rev.1), to replace the 2012 edition, which is currently referenced in §§ 171.22; 171.23; 171.26; 173.415; 173.416; 173.417; 173.435; and 173.473. The IAEA regulations establish standards of safety for control of the radiation, criticality, and thermal hazards to people, property, and the environment that are associated with the transport of radioactive materials. Notable changes from the previous 2012 edition include clarification of certain marking requirements, a new group of surface contaminated objects SCO-III for “UN2914,” and amendments to basic radionuclide values (activity of the radionuclide as listed in § 173.435) for seven specific radionuclides (Ba-135m, Ge-69, Ir-193m, Ni-57, Sr-83, Tb-149 and Tb-161). The Regulations for the Safe Transport of Radioactive Material are available for download (free PDF) and purchase in hard copy on the IAEA web site at:
<https://www.iaea.org/publications/12288/regulations-for-the-safe-transport-of-radioactive-material>.
- In paragraph (t)(1), incorporate by reference the 2021-2022 edition of the ICAO Technical Instructions, to replace the 2019-2020 Edition, which is currently referenced in §§ 171.8; 171.22; 171.23; 171.24; 172.101; 172.202; 172.401; 172.407; 172.512; 172.519; 172.602; 173.56; 173.320; 175.10, 175.33; and 178.3. The ICAO Technical Instructions specify detailed instructions for the safe

international transport of dangerous goods by air. The requirements in the 2021-2022 edition have been amended to better align with the 21st revised edition of the UNMR and the IAEA Regulations for the Safe Transport of Radioactive Material. Notable changes in the 2021-2022 edition of the ICAO Technical Instructions include new packing and stowage provisions, new and revised entries on the Dangerous Goods List, and editorial corrections. The 2021-2022 edition of the ICAO Technical Instructions are available for purchase on the ICAO web site at <https://store.icao.int/en/shop-by-areas/safety/dangerous-goods>.

- In paragraph (v)(2), incorporate by reference the 2020 edition of the IMDG Code, Incorporating Amendment 40-20 (English Edition), to replace Incorporating Amendment 39-18, 2018 Edition, which is currently referenced in §§ 171.22; 171.23; 171.25; 172.101; 172.202; 172.203; 172.401; 172.407; 172.502; 172.519; 172.602; 173.21; 173.56; 176.2; 176.5; 176.11; 176.27; 176.30; 176.83; 176.84; 176.140; 176.720; 176.906; 178.3; and 178.274. The IMDG Code is a unified international code that outlines standards and requirements for the transport of dangerous goods by vessel. Notable changes in Amendment 40-20 include new packing and stowage provisions, new and revised entries on the Dangerous Goods List, and editorial corrections. Distributors of the IMDG Code can be found on the International Maritime Organization (IMO) web site at: <https://www.imo.org/en/publications/Pages/Distributors-default.aspx>.
- In paragraph (w), incorporate by reference or remove the following ISO documents to include new and updated standards for the specification, design, construction, testing, and use of gas cylinders:
 - ISO 10156:2017, “*Gas cylinders — Gases and gas mixtures — Determination of fire potential and oxidizing ability for the selection of cylinder valve outlets*” in paragraph (w)(38) and referenced in § 173.115. ISO 10156

specifies methods for determining whether a gas or gas mixture is flammable in air and whether a gas or gas mixture is more or less oxidizing than air under atmospheric conditions. It is intended to be used for the classification of gases and gas mixtures including the selection of gas cylinder valve outlets. This amendment removes ISO 10156:2010, third edition, and the associated corrigendum (ISO 10156:2010/Cor.1:2010(E)), from the HMR and adds the revised ISO 10156:2017(E), fourth edition, as the former documents have been withdrawn by ISO and replaced with the updated 2017 versions. As part of the five-year periodic review of all standards, ISO reviewed ISO 10156:2010 and published an updated version, ISO 10156:2017, which was published in September 2017 and adopted in the 21st revised edition of the UNMR. While many of the edits in this 2017 version were editorial changes made to suit the ISO publication rules, the standard has also been supplemented with a test method to determine the flammability limits of gases and gas mixtures in air and a calculation method to determine the lower flammability limit of a gas mixture. PHMSA expects that the latter change will enhance safety by providing improved instruction on the determination of flammability of gases and gas mixtures which aids in the proper selection of a valve. (See § 173.115 of the Section-by-Section Review of Amendments for additional discussion of this change).

- ISO 10297:2014/Amd 1:2017, “*Gas cylinders — Cylinder valves — Specification and type testing*” in paragraph (w)(42) and referenced in §§ 173.301b and 178.71. ISO published this supplemental amendment to the 2014 version of this document (i.e., ISO 10297:2014) to clarify valve requirements for tubes and pressure drums and to correct errors found in the 2014 version. PHMSA references this amendment in §§ 173.301b and

178.71, where use of ISO 10297:2014 is required. PHMSA reviewed this document and determined that the amendments provide additional safety benefits for hazardous materials in transportation.

- ISO 10462:2013, “*Gas cylinders — Transportable cylinders for dissolved acetylene — Periodic inspection and maintenance.*” PHMSA is deleting the second edition of ISO 10462 currently in paragraph (w)(44) from the list of materials incorporated by reference. PHMSA requires the use of ISO 10462 for the requalification of a dissolved acetylene cylinder in § 180.207. In final rule HM-215N,¹³ PHMSA incorporated by reference the updated third edition of ISO 10462; however, the rule included a sunset provision to allow continued use of this second edition until December 31, 2018. Because this date has since passed, and the second edition is no longer authorized for use under § 180.207, PHMSA is removing the reference to this edition in § 171.7, as well as making a conforming revision to remove the sunset provision in § 180.207.
- ISO 11114-1:2012/Amd 1:2017(E), “*Gas cylinders — Compatibility of cylinder and valve materials with gas contents — Part 1: Metallic materials — Amendment 1.*” In paragraph (w)(47), PHMSA is referencing - ISO 11114-1:2012/Amd 1:2017(E), in §§ 172.102, 173.301b, and 178.71. The 2017 ISO 11114-1:2012/Amd 1:2017(E) document supplements ISO 11114-1:2012(E), which provides requirements for the selection of safe combinations of metallic cylinder and valve materials, and cylinder gas contents. As part of ISO’s regular five-year review of its standards, the 2012 version of this document was amended through the issuance of this supplemental document, ISO 11114-1:2012/Amd 1:2017(E). The ISO 11114-1:2012/Amd 1:2017(E)

¹³ 82 FR 15796 (Mar. 30, 2017).

document amends the 2012 version by providing more explicit instructions on the permissible concentrations of gases containing halogens in aluminum cylinders. It also provides amended requirements for butylene, hydrogen cyanide, hydrogen sulfide and nitric oxide. Consequently, the 21st revised edition of the UNMR updated all references to the 2012 edition to include a reference to the supplemental amendment (ISO 11114-1:2012/Amd 1:2017(E)). PHMSA revises the HMR likewise, by amending Special Provision 379, §§ 173.301b and 178.71 where ISO 11114-1:2012(E) is permitted or required, to also require compatibility with ISO 11114-1:2012/Amd 1:2017(E).

- ISO 11119-1:2012(E), “*Gas cylinders—Refillable composite gas cylinders and tubes—Design, construction and testing—Part 1: Hoop wrapped fibre reinforced composite gas cylinders and tubes up to 450 l,*” found in paragraph (w)(55). This document specifies requirements for composite gas cylinders and tubes between 0.5 L and 450 L water capacity, for the storage and conveyance of compressed or liquefied gases. ISO 11119-1:2012(E) is currently incorporated by reference in § 178.71; however, PHMSA is further incorporating by reference in § 178.75 to allow for the use of this ISO standard for specification multi-element gas containers (MEGCs).
- ISO 11119-2:2012(E), “*Gas cylinders—Refillable composite gas cylinders and tubes—Design, construction and testing—Part 2: Fully wrapped fibre reinforced composite gas cylinders and tubes up to 450 l with load-sharing metal liners*” found in paragraph (w)(57). ISO 11119-2:2012 specifies requirements for composite gas cylinders and tubes between 0.5 L and 450 L water capacity, for the storage and conveyance of compressed or liquefied gases. ISO 11119-2:2012(E) is currently incorporated by reference in

§ 178.71; however, PHMSA further incorporates by reference in § 178.75 use of this ISO standard for specification MEGCs.

- ISO 11119-2:2012/Amd.1:2014(E), “Gas cylinders—Refillable composite gas cylinders and tubes—Design, construction and testing—Part 2: Fully wrapped fibre reinforced composite gas cylinders and tubes up to 450 L with load-sharing metal liners, Amendment 1” found in paragraph (w)(58). ISO 11119-2:2012/Amd. 1:2014(E) is currently incorporated by reference in § 178.71; however, PHMSA further incorporates by reference in § 178.75 the use of this ISO standard for specification MEGCs. This supplemental amendment was published to align the drop test originally provided in ISO 11119-2 with the drop test outlined in ISO 11119-3 “*Gas cylinders of composite construction—Specification and test methods—Part 3: Fully wrapped fibre reinforced composite gas cylinders with non-load-sharing metallic or non-metallic liners*”.
- ISO 11119-3:2013(E), “*Gas cylinders of composite construction—Specification and test methods—Part 3: Fully wrapped fibre reinforced composite gas cylinders with non-load-sharing metallic or non-metallic liners*” listed in paragraph (w)(60). This document is currently incorporated by reference in § 178.71; however, PHMSA is additionally incorporating by reference in § 178.75. ISO 11119-3:2013 specifies requirements for composite gas cylinders up to 150 L water capacity and composite tubes above 150 L water capacity and up to 450 L water capacity, for the storage and conveyance of compressed or liquefied gases.
- ISO 11119-4:2016, “*Gas cylinders — Refillable composite gas cylinders — Design, construction and testing — Part 4: Fully wrapped fibre reinforced composite gas cylinders up to 150 l with load-sharing welded metallic liners,*”

in (w)(61), which PHMSA references in §§ 178.71 and 178.75. This standard provides requirements for composite gas cylinders with load-sharing welded liners between 0.5 L and 150 L water capacity and a maximum test pressure of 450 bar¹⁴ for the storage and conveyance of compressed or liquefied gases. PHMSA is requiring UN composite cylinders and tubes to conform to this standard in § 178.71. *See* 178.71 of Section-by-Section Review of Amendments for additional discussion on this new incorporation by reference.

- ISO 14246:2014/Amd 1:2017, “*Gas cylinders — Cylinder valves — Manufacturing tests and examinations — Amendment 1*,” in paragraph (w)(71). PHMSA is adding a reference to this document in § 178.71. This one-page amendment, published in 2017, is intended for use in conjunction with ISO 14246:2014, which specifies the procedures and acceptance criteria for manufacturing testing and examination of cylinder valves that have been manufactured to achieve type approval. This 2017 document amends the 2014 version by updating the pressure test and leakproofness test specifically for acetylene valves. Consequently, the 21st revised edition of the UNMR updated all references to the 2014 edition to include a reference to the supplemental amendment (ISO 14246/Amd 1:2017). Therefore, PHMSA is likewise adding a reference to this supplement in § 178.71, which requires inspection and testing in accordance with ISO 14246:2014. *See* 178.71 of the Section-by-Section Review of Amendments for additional discussion.
- ISO 17879:2017, “*Gas cylinders — Self-closing cylinder valves — Specification and type testing*,” in paragraph (w)(75). PHMSA is adding a reference to this standard in §§ 173.301b and 178.71. This standard provides the design, type testing, marking, and manufacturing tests and examination

¹⁴ 1 Bar = 100 kPa = 14.504 psi.

requirements for self-closing cylinder valves intended to be fitted to refillable transportable gas cylinders used to transport compressed, liquefied, or dissolved gases.

- ISO 20475:2018, “*Gas cylinders — Cylinder bundles — Periodic inspection and testing*” in paragraph (w)(77). This standard provides the requirements for the periodic inspection and testing of cylinder bundles containing compressed, liquefied, and dissolved gas. PHMSA is adding a reference to this standard in § 180.207, which provides the requirements for requalification of UN pressure receptacles.
- All ISO standards are available for preview and purchase at:
<https://www.iso.org/standards.html>.
- In paragraph (aa)(3), incorporate by reference the updated 2016 version of the OECD Guidelines for the Testing of Chemicals “*Test No. 431: In vitro skin corrosion: reconstructed human epidermis (RHE) test method.*” PHMSA is updating the version of OECD Guidelines for the Testing of Chemicals Test No. 431 referenced in § 173.137, to maintain alignment with the UNMR. This document is used for the identification of corrosive chemical substances and mixtures. This updated edition includes in vitro methods allowing for better differentiation between hazard categories, which had not been possible under earlier editions due to the limited set of well-known in vivo corrosive sub-category chemicals against which to validate in vitro testing results. Therefore, this updated test protocol may provide clearer distinctions between severe and less severe skin corrosives. OECD test methods can be found in the OECD iLibrary available at: <https://www.oecd-ilibrary.org/>.
- In paragraph (dd), incorporate by reference United Nations standards including:

- “*Recommendations on the Transport of Dangerous Goods—Model Regulations*,” 21st revised edition (2019), Volumes I and II, in paragraph (dd)(1), which are referenced in §§ 171.8; 171.12; 172.202; 172.401; 172.407; 172.502; 172.519; 173.22; 173.24; 173.24b; 173.40; 173.56; 173.192; 173.302b; 173.304b; 178.75; and 178.274. The UNMR provide framework provisions promoting uniform development of national and international regulations governing the transportation of hazardous materials by various modes of transport. At its ninth session on December 7, 2018, the UNSCOE on the Transport of Dangerous Goods and on the GHS adopted amendments to the UNMR concerning, inter alia: electric storage systems (including lithium batteries installed in cargo transport units and defective batteries), explosives, infectious waste of Category A, waste gas cartridges, harmonization with the 2018 edition of IAEA’s Regulations for the Safe Transport of Radioactive Material, listing of dangerous goods, update of LC50 values for some toxic gases, and use of in vitro skin corrosion methods for classification. Therefore, PHMSA is adopting this revised edition in order to reflect these important updates.
- The Manual of Tests and Criteria, 7th revised edition (2019), in paragraph (dd)(2), which is referenced in §§ 171.24, 172.102; 173.21; 173.56; 173.57; 173.58; 173.60; 173.115; 173.124; 173.125; 173.127; 173.128; 173.137; 173.185; 173.220; 173.221; 173.224; 173.225; 173.232; part 173, appendix H; 175.10; 176.905; and 178.274. The Manual of Tests and Criteria contains instruction for the classification of hazardous materials for purposes of transportation according to the UNMR. PHMSA replaces the sixth revised edition (2015) and the sixth revised edition, Amendment 1 (2017) with the 7th revised edition. The amendments adopted in 2018 for the 7th revised edition

include: a full review of the text of the Manual to facilitate its use in the context of the GHS; a new test under test series 8 to determine the sensitiveness of a candidate ammonium nitrate, emulsion or suspension, or gel, intermediate for blasting explosive, to the effect of intense localized thermal ignition under high confinement; new provisions addressing classification of polymerizing substances for transport; stability tests for nitrocellulose mixtures (new Appendix 10); and a compilation of classification results on industrial nitrocellulose in accordance with Chapter 2.17 of the GHS, which can be used for the classification of industrial nitrocellulose based products (new Appendix 11). Additionally, the Committee considered that the reference to the “Recommendations on the Transport of Dangerous Goods” in the title of the manual was no longer appropriate and decided that the manual should be entitled “*Manual of Tests and Criteria.*” Therefore, PHMSA amends the title of this document in the list of reference material in § 171.7 to reflect this change. Finally, PHMSA is adopting this revised edition in order to reflect these important updates.

- “*Globally Harmonized System of Classification and Labelling of Chemicals*”, eighth revised edition (2019) in paragraph (dd)(3), which is referenced in § 172.401. The GHS standard provides a basic scheme to identify the hazards of substances and mixtures and to communicate the hazards. At its ninth session on December 7, 2018, the Committee adopted a set of amendments to the 7th revised edition of the GHS which include, inter alia: new classification criteria, hazard communication elements, decision logics, and guidance for chemicals under pressure; new provisions for the use of in vitro/ex vivo data and non-test methods to assess skin corrosion and skin irritation; miscellaneous amendments to clarify the classification criteria for Specific

Target Organ Toxicity; revised and further rationalized precautionary statements and an editorial revision of Sections 2 and 3 of Annex 3; new examples of precautionary pictograms to convey the precautionary statement “Keep out of reach of children”; a new example in Annex 7 addressing labelling of sets or kits; and guidance on the identification of dust explosion hazards and the need for risk assessment, prevention, mitigation, and hazard communication. Therefore, PHMSA is adopting this revised edition in order to reflect these important updates.

- “*Agreement concerning the International Carriage of Dangerous Goods by Road*,” in (dd)(4), which is referenced in § 171.23. The Agreement concerning the International Carriage of Dangerous Goods by Road (ADR) outlines regulations concerning the international carriage of dangerous goods by road within the EU and other countries that are party to the agreement. PHMSA removes references to the 2019 edition of the ADR, ECE/TRANS/257, and adds references to volumes I and II and the corrigendum of the 2020 edition, ECE/TRANS/300. The ADR can be accessed at: https://www.unece.org/trans/danger/publi/adr/adr_e.html. The main changes to the 2020 edition include revisions to the P200 packaging section for cylinders and updates to reference various updated ISO publications. As such, PHMSA is adopting this revised edition in order to reflect these important updates.

The following standards are already incorporated by reference in the section(s) in which they appear in the regulatory text: ISO 10297:1999(E), ISO 10297:2006(E), ISO 10297:2014(E), ISO 10461:2005(E), ISO 10462:2013(E), ISO 10692-2:2001(E), ISO 10692-2:2001(E), ISO 11114-1:2012(E), ISO 11114-2:2013(E), ISO 11117:1998(E): ISO 11117:2008(E), ISO 11117:2008/Cor.1:2009(E): ISO 11118(E), ISO 11118:2015(E), ISO

11119-1(E), ISO 11119-2(E), ISO 11119-3(E), ISO 11120(E), ISO 11120:2015(E), ISO 11513:2011(E), ISO 11621(E), ISO 11623(E), ISO 11623:2015(E), ISO 13340:2001(E); ISO 13736:2008(E), ISO 14246:2014(E), ISO 16111:2008(E), ISO 16148:2016(E), ISO 17871:2015(E), ISO 18172-1:2007(E), ISO 20703:2006(E), ISO 21172-1:2015(E), ISO 22434:2006(E), and ISO/TR 11364:2012(E); European Directive 2010/35/EU; Transport Canada TDG Regulations; Test Nos. 404, 430, and 435.

Section 171.8

Section 171.8 defines terms used throughout the HMR that have broad or multi-modal applicability. Currently, the definitions provided in § 171.8 for SADT and SAPT—i.e., “self-accelerating decomposition temperature” and “self-accelerating polymerization temperature”—only spell out the abbreviations and direct users to § 173.21—Forbidden materials and packages—for the actual defining criteria. In the NPRM, we proposed to make editorial changes to improve the utility of the definitions of SADT and SAPT by providing a clear explanation of these terms in the context of packaging within the HMR. As such, DGAC provided comments in response to the NPRM in support of PHMSA’s proposed revision of the definitions for SADT and SAPT; and confirmed that these changes will clarify understanding of these terms and assist selection of the proper packaging of these materials. Therefore, PHMSA is making editorial changes to improve the utility of the definitions of SADT and SAPT by providing a clear explanation of these terms in the context of packaging within the HMR.

Section 171.12

Paragraph (a) of § 171.12 prescribes requirements for the use of the TDG Regulations for hazardous materials transported from Canada to the United States, from the United States to Canada, or through the United States to Canada or a foreign

destination. In this final rule, PHMSA amends § 171.12(a)(1) to authorize the use of a temporary certificate issued by Transport Canada for motor carrier or rail transportation of a hazardous material.

In a 2017 rulemaking—HM-215N¹⁵—PHMSA authorized hazardous materials to be offered for transportation or transported by motor carrier and rail in accordance with an equivalency certificate issued by Transport Canada, as an alternative to transportation of these items under the TDG Regulations as provided in § 171.22. The HMR amendment resulted from negotiations by the U.S.-Canada Regulatory Cooperation Council (RCC), a government-to-government forum established in 2011 by the President of the United States and the Canadian Prime Minister for PHMSA and Transport Canada, respectively, to identify and resolve—with input from stakeholders—impediments to cross-border transportation of hazardous materials. Among the initiatives agreed upon by PHMSA and Transport Canada within the RCC was modification of their respective regulations to ensure reciprocal recognition of special permits (PHMSA) and certificates (Transport Canada) specifying the terms and conditions authorizing deviations from their respective regulatory requirements governing transportation of hazardous materials.

Subsequently, Transport Canada recognized PHMSA's special permits, which are issued based on either being in the public interest or on the basis that the permit provides a demonstrable equivalent level of safety. *See* § 107.105(d). In HM-215N, PHMSA revised the HMR to recognize equivalency certificates by Transport Canada based on a finding of safety equivalence with the TDG Regulations. That rulemaking did not, however, reflect the fact that Transport Canada also issues temporary certificates authorizing deviation from the TDG Regulations on a finding that transportation of certain hazardous materials is in the public interest. Transport Canada issues temporary certificates after a technical review by its subject matter experts of an applicant's

¹⁵ 82 FR 15796 (Mar. 30, 2017).

supporting documentation demonstrating shipment of the hazardous material is in the public interest. Temporary certificates are of limited duration and specify terms and conditions—often extensive—to mitigate risks to public safety and the environment. Transport Canada posts all temporary certificates to its publicly available website.¹⁶

PHMSA has evaluated Transport Canada’s practices in reviewing and issuing temporary certificates and expects that PHMSA’s recognition of those certificates for motor carrier or rail transportation of hazardous materials will not adversely affect safety. As noted above, Transport Canada issues those certificates only after a technical review is completed by its own subject matter experts to mitigate residual risks to public safety and the environment as outlined by the certificates’ terms and conditions, including limiting duration of those temporary certificates. Additionally, other regulatory requirements (of Transport Canada or PHMSA) not excepted by a temporary certificate remain in effect. PHMSA further notes that, consistent with the HMR’s existing authorization in § 171.12 for reliance on the TDG Regulations to authorize certain shipments in the United States, the new authorization to use a temporary certificate applies only for the duration of a shipment. In other words, once a shipment offered in accordance with a temporary certificate reaches its destination, any subsequent offering of packages imported under a Transport Canada temporary certificate must be completed in full compliance with the HMR. PHMSA’s revisions to § 171.12 further mitigates risk to public safety and the environment by applying only to motor carrier and rail.

The recognition of Transport Canada-issued temporary certificates improves cross-border movement of hazardous materials responding to the COVID-19 public health emergency or other future emergencies. For example, among the temporary certificates recently issued by Transport Canada are several authorizing exceptions from

¹⁶ See Transport Canada, “Approvals - Search by Certificate Number,” <https://wwwapps.tc.gc.ca/Saf-Sec-Sur/3/approvals-approbations/SearchCertificates.aspx> (last visited Apr. 16, 2021).

TDG Regulations to enable movement of hand sanitizer chemicals and COVID-19 test samples.¹⁷ These revisions to the HMR help to ensure that, should Transport Canada issue additional temporary certificates responding to the COVID-19 public health emergency or another cross-border threat to public safety or the environment, the HMR will not be an obstacle to those efforts. Dow, DGAC, and COSTHA all provided comments in support of the amendment to improve cross-border movement of hazardous materials. Commenters added that this revision will improve efforts in responding to the COVID-19 and other potential public health emergencies.

Section 171.23

Section 171.23 outlines the requirements for specific materials and packagings transported under the ICAO Technical Instructions, IMDG Code, Transport Canada TDG Regulations, or the IAEA Regulations. It also includes provisions that authorize the use—under specific conditions—of pi-marked pressure vessels, which are pressure vessels and pressure receptacles that comply with ECE/TRANS/257, the ADR, and the EU Directive 2010/35/EU, and marked with a pi (π) symbol to denote such compliance. PHMSA is amending § 171.23(a) to update the reference to ECE/TRANS/257 to: (1) reference the 2020 edition of this document, ECE/TRANS/300; and (2) reference both volumes I and II of the ADR. Specifically, § 171.23(a) authorizes cylinders that comply with the requirements of Packing Instruction P200 (packing instruction for cylinders, tubes, pressure drums, and bundles of cylinders) or P208 (packing instruction for Class 2 adsorbed gases) and 6.2 (requirements for the construction and testing of pressure receptacles, aerosol dispensers, small receptacles containing gas (gas cartridges), and fuel cell cartridges containing liquefied flammable gas) of the ADR, published in 2019 as

¹⁷ See Transport Canada, “Temporary Certificates,” <https://tc.canada.ca/en/dangerous-goods/temporary-certificates> (last visited Apr. 16, 2021).

document ECE/TRANS/257. Upon review of the 2020 edition of this document, ECE/TRANS/300, PHMSA did not find any substantive changes to the provisions in 6.2, P200, or P208, and therefore, does not expect that incorporating by reference ECE/TRANS/300 will impose any safety risk or economic impact. However, updating the version incorporated by reference to reflect the edition that is currently in force facilitates access to foreign markets by U.S. manufacturers and businesses.

B. Part 172

Section 172.101 Hazardous Materials Table (HMT)

The HMT summarizes terms and conditions governing transportation of certain hazardous materials under the HMR. For each entry, the HMT identifies information such as the proper shipping name, UN identification number, and hazard class. The HMT specifies additional information or reference requirements in the HMR such as hazard communication, packaging, quantity limits aboard aircraft, and stowage of hazardous materials aboard vessels. In this final rule, PHMSA amends certain entries in the HMT to reflect the regulatory amendments discussed below in the Section-by-Section Review of Amendments. For purposes of the Government Publishing Office's typesetting procedures, changes to the HMT appear under three sections of the HMT: "remove," "add," and "revise." Certain entries in the HMT, such as those with revisions to the proper shipping names, appear as a "remove" and "add." Amendments to the HMT include the following:

New HMT Entries

- UN0511, Detonators, electronic programmable for blasting
- UN0512, Detonators, electronic programmable for blasting
- UN0513, Detonators, electronic programmable for blasting

- UN3549, Medical Waste, Category A, Affecting Humans, *solid or* Medical Waste, Category A, Affecting Animals *only, solid*

The UNMR contain a new entry to its Dangerous Goods List for regulated medical waste in Category A (*see* above list for UN3549). In the NPRM, PHMSA proposed to add this new entry for this proper shipping name and UN number and assigning Special Provision 131 to inform offerors that an approval is required when shipping this material.

DGAC and HWI provided comments supporting the inclusion of a new entry in the HMT for “UN3549, Medical Waste, Category A, Affecting Humans, *solid or* Medical Waste, Category A, Affecting Animals *only, solid.*” However, DGAC and HWI believe that PHMSA should include the corresponding packing provisions in the UNMR associated with “UN3549, Medical Waste, Category A, Affecting Humans, *solid or* Medical Waste, Category A, Affecting Animals *only, solid.*” DGAC asserts that PHMSA should accept the internationally recognized packaging for these materials as a part of the international harmonization process. Both DGAC and HWI believe that continuing to require special permits or approvals for the packaging of these materials does little to enhance transportation safety. HWI adds that the special permit process can take a significant amount of time and recommends that PHMSA provide initial packaging guidance for Category A medical wastes, so that generators have an immediate, safe, and compliant packaging solution.

PHMSA is adding “UN3549, Medical Waste, Category A, Affecting Humans, *solid or* Medical Waste, Category A, Affecting Animals *only, solid*” to the HMT in order to provide a more detailed proper shipping name for the shipment of biological waste. PHMSA acknowledges that in biological emergency response crises, such as the response to Ebola outbreaks, it is critical to have approved packagings for cleanup of biological waste. However, PHMSA asserts that due to the unknown nature of any infectious agent

that may produce a category A biological waste, it is necessary to retain greater oversight of the safety and operational controls associated with approved packagings via the special permit process. PHMSA's special permit process can accommodate emergency processing of applications for instances associated with transportation of hazardous materials during a public health emergency or natural disaster. For these reasons PHMSA is not assigning baseline packaging provisions in the HMT for to the new proper shipping name "UN3549, Medical Waste, Category A, Affecting Humans, *solid or* Medical Waste, Category A, Affecting Animals *only, solid.*" However, PHMSA is assigning Special Provision 131 to state that approval from the Associate Administrator, through a special permit, is required when offering this material for transportation.

PHMSA assigns a new special provision, Special Provision 430, to specify the appropriate use of this proper shipping name. The addition of a proper shipping name that more specifically describes the material in transportation is expected to reduce regulatory burdens in shipping this material internationally and domestically. By limiting the scope of transport by way of special provision approval requirements for each shipment, PHMSA can exercise greater oversight of the transport of these materials to, from, or within the United States.

PHMSA is adding three new entries for the proper shipping name "Detonators, electronic *programmable for blasting*" with the following new UN numbers: UN0511, UN0512, and UN0513. These entries were added in the 21st revised edition of UNMR as result of a proposal from the Australian Explosives Industry and Safety Group (AEISG) and ensuing discussions held by the UN Working Group on Explosives (EWG) of the Sub-Committee of Experts on the Transport of Dangerous Goods in 2017 and 2018.¹⁸ AEISG proposed adding new entries in the UNMR for electronic detonators to

¹⁸ <https://unece.org/fileadmin/DAM/trans/doc/2018/dgac10c3/ST-SG-AC.10-C.3-2018-58e.pdf>

distinguish them from electric detonators, which have significantly different design characteristics.

The HMT has nine entries for detonators—not used for ammunition—which include: “Detonators, non-electric for blasting,” “Detonators, electric for blasting,” and “Detonator assemblies, non-electric for blasting,” which may fall in to one of three hazard classes (1.1B, 1.4B, or 1.4S). Under the hazardous materials classification scheme, based on the existing available entries, electronic detonators are required to be transported as “Detonators, electric for blasting” which is not the most accurate description. While using this name does not pose inherent risks during transportation, it creates potential for risks in down-stream storage, use, and handling operations. Because electronic detonators are significantly different from other electric and non-electric detonators, PHMSA is adding new entries for these devices rather than including them within the existing entries for electric detonator types. As with other explosives, the proper classification of these devices depends on packaging and testing, hence new entries must include all possible hazard classifications (1.1B, 1.4B, and 1.4S). For other newly added hazardous materials assigned a UN number on the Dangerous Goods List in the UNMR, PHMSA is adding: UN0511 (1.1B), UN0512 (1.4B), and UN0513 (1.4S) to the HMT to facilitate proper classification and handling across governmental and modal jurisdictions. PHMSA determined that this change provides clarity and enhanced safety by adding more specific proper shipping names to describe the difference between electronic detonators and electric detonators. PHMSA received a comment from IME in support of including these three new hazardous materials descriptions for electronic detonators in the HMT.

Column (1) Symbols

Section 172.101(b) describes column (1) of the HMT and symbols providing for additional requirements for transportation of listed hazardous materials that may be indicated in the column. As provided in § 172.101(b)(1): (1) the symbol “A” identifies a material that is subject to the requirements of the HMR only when offered or intended for transportation by aircraft; (2) the symbol “W” identifies a material that is subject to the requirements of the HMR only when offered or intended for transportation by vessel; and (3) the symbol “I” identifies proper shipping names which are appropriate for describing materials in international transportation. The UNMR were amended for consistency with the ICAO Technical Instructions to indicate that in addition to being regulated by vessel, the following entries are also regulated for air transport: “UN1372, Fibers, animal *or* Fibers, vegetable *burnt, wet or damp*,” “UN1387, Wool waste, wet,” “UN1856, Rags, oily,” “UN1857, Textile waste, wet,” and “UN3360, Fibers, vegetable, dry.” In the case of these particular entries, they are forbidden for air transport in the ICAO Technical Instructions. While reviewing this amendment, PHMSA found that all of these entries except for “UN3360, Fibers, vegetable, dry,” are also identified as only being regulated for air and vessel transportation as denoted by the symbols “A” and “W” in column (1). For UN3360, the symbols “I” and “W” are presently assigned in column (1) and the quantity limit in column (9) is “No Limit” for both passenger and cargo air. This is inconsistent with the ICAO Technical Instructions which forbid this material for transport by air. Therefore, consistent with the ICAO Technical Instructions for the UN3360 entry, PHMSA adds the symbol “A” to column (1) and amends column (9) to read “Forbidden.” This is further consistent with the entries for similar materials “UN1372, Fibers, animal *or* Fibers, vegetable” and “UN1373, Fibers *or* Fabrics, animal *or* vegetable *or* Synthetic, n.o.s.” that are also assigned the symbol “A” in column (1) and “Forbidden” in column

(9). PHMSA determines that this change will facilitate international air transportation and save shippers time and costs by preventing delayed and rejected shipments.

Column (2) Hazardous Materials Descriptions and Proper Shipping Names

Section 172.101(c) describes column (2) of the HMT and the requirements for hazardous materials descriptions and proper shipping names. The UNMR contain the entry “UN3363, Dangerous Goods in Articles *or* Dangerous Goods in Machinery *or* Dangerous Goods in Apparatus,” in its Dangerous Goods List; however, the HMT entry UN3363 does not include “Dangerous Goods in Articles *or*,” in the proper shipping name. PHMSA is adding “Dangerous Goods in Articles *or*,” to the proper shipping name. This change provides flexibility for shippers selecting the most appropriate proper shipping name by adding a third option in the proper shipping name associated with this UN Number. Additionally, for the proper shipping name “Fuel system components (including fuel control units (FCU), carburetors, fuel lines, fuel pumps)” which currently directs HMT users to “see Dangerous Goods in Apparatus *or* Dangerous Goods in Machinery”, PHMSA is amending the directions to include a reference to “Dangerous Goods in Articles.” PHMSA expects that these changes will improve hazard communication by including a more specific description for articles containing hazardous materials.

Additionally, for the entry “UN2522, 2-Dimethylaminoethyl methacrylate,” PHMSA is adding the word “stabilized” to this proper shipping name to identify this material as a polymerizing substance. Discussions held by the UNSCOE identified “UN2522, 2-Dimethylaminoethyl-methacrylate” as having a similar molecular structure and polymerization behaviors to “UN 3302, 2-Dimethylaminoethyl acrylate, stabilized.” Under the HMR and international regulations, polymerizing substances require verification that a sufficient level of stabilization is provided prior to transportation. This

requirement for stabilization is also indicated by assignment of Special Provision 387 in the HMT, which PHMSA adds for UN2522.

Finally, for the entry “UN3171, Battery-powered vehicle or Battery-powered equipment,” PHMSA is making an editorial change to italicize the “or” in the hazardous material description. Currently, the “or” is in roman type and not italicized. Section 172.101(c) introductory text instructs that proper shipping names are limited to those in roman type. Moreover, the current form of the entry is such that a person may confuse the proper shipping name with the whole description and not the option of “Battery-powered vehicle” or “Battery-powered equipment.” Therefore, PHMSA revises the entry to read “Battery-powered vehicle *or* Battery-powered equipment.”

Column (5) Packing Group

Section 172.101(f) describes column (5) of the HMT, which specifies one or more packing groups—PG I, II, or III—assigned to certain materials. A PG designation indicates the required level of packaging according to the degree of danger presented by hazardous materials. PG I indicates the greatest level of danger, PG II corresponds to a medium level of danger, and PG III corresponds to a minor danger.

In the NPRM, PHMSA proposed to remove the assignment of PG II as indicated in column (5) for the entry “UN3291, Regulated medical waste, n.o.s. *or* Clinical waste, unspecified, n.o.s. *or* (BIO) Medical waste, n.o.s. *or* Biomedical waste, n.o.s., *or* Medical Waste n.o.s.” This entry is the only entry with a Division 6.2 classification that has PG II assigned in column (5).

HWI provided comments in support of harmonizing with international standards by removing the assignment of PG II from column (5) of the HMT for the “UN 3291, Regulated medical waste, n.o.s.” entry. However, HWI notes that “PG II” is currently widely utilized as part of the proper shipping description marking on regulated medical

waste containers, of which many of their members have a significant inventory. HWI seeks confirmation that that packages with “PG II” printed on the package as part of the proper shipping description can still be used permissively.

PHMSA confirms that packages marked with “PG II” as part of the proper shipping name can permissively be used if the package otherwise complies with §§ 172.303 and 172.304 marking requirements. HWI further suggests PHMSA clarify that PG II containers are still required to meet the packaging requirements in § 173.197 and that the removal of the packing group from the HMT does not negate authorized packaging at the PG II performance level. PHMSA agrees that the PG II performance level requirements for packaging used for regulated medical waste in § 173.197 would still apply; however, we do not believe further clarification is necessary as we did not propose changes to the packaging provisions. It is clear that § 173.197 is assigned to “UN3291” material in the HMT for authorized non-bulk packagings, for example, and that the packaging requirements in paragraph (b) required UN standard packagings at the PG II performance level.

Therefore, PHMSA is amending this entry to not include PG II in column (5) of the HMT and to align with international regulations and § 172.101(f), which specifically states that Division 6.2 materials are not assigned packing groups in the HMR. For packaging purposes, any requirement for a specific packaging performance level is set out in the applicable packaging authorizations of part 173. Instead of having PG II indicated in Column (5), packaging provisions for these materials would continue to be outlined in § 173.197. PHMSA expects this editorial change will maintain the current level of safety as no packaging provisions are changing.

Column (6) Label Codes

Section 172.101(g) describes column (6) of the HMT, which contains label codes representing the hazard warning labels required for specific hazardous materials in the HMT. In the HM-215O final rule,¹⁹ PHMSA added twelve HMT entries as part of a classification scheme for articles containing hazardous materials not otherwise specified by name (i.e., n.o.s. entries) in the HMR. The entries were inadvertently added without label codes in column (6). PHMSA is correcting the entries here by adding the appropriate label codes to the following:

- UN3537, Articles containing flammable gas, n.o.s.
- UN3538, Articles containing non-flammable, non-toxic gas, n.o.s.
- UN3539, Articles containing toxic gas, n.o.s.
- UN3540, Articles containing flammable liquid, n.o.s.
- UN3541, Articles containing flammable solid, n.o.s.
- UN3542, Articles containing a substance liable to spontaneous combustion, n.o.s.
- UN3543, Articles containing a substance which in contact with water emits flammable gases, n.o.s.
- UN3544, Articles containing oxidizing substance, n.o.s.
- UN3545, Articles containing organic peroxide, n.o.s.
- UN3546, Articles containing toxic substance, n.o.s.
- UN3547, Articles containing corrosive substance, n.o.s.
- UN3548, Articles containing miscellaneous dangerous goods, n.o.s.

¹⁹ 85 FR 27810 (May 11, 2020).

Column (7) Special Provisions

Section 172.101(h) describes column (7) of the HMT, which assigns special provisions for each HMT entry. Section 172.102 provides for the meaning and requirements of the special provisions assigned to entries in the HMT. The revisions to column (7) of certain entries in the HMT are discussed below. Also, *see* § 172.102 of the Section-by-Section Review of Amendments below for a detailed discussion of the special provision amendments addressed in this final rule.

Special Provisions 196 and 197:

PHMSA is adding new Special Provision 196 to the following HMT entries to outline thermal stability testing requirements for their transportation:

- UN0340, Nitrocellulose, *dry or wetted with less than 25 percent water (or alcohol), by mass*
- UN0341, Nitrocellulose, *unmodified or plasticized with less than 18 percent plasticizing substance, by mass*
- UN0342, Nitrocellulose, *wetted with not less than 25 percent alcohol, by mass*
- UN0343, Nitrocellulose, *plasticized with not less than 18 percent plasticizing substance, by mass.*

PHMSA is assigning new Special Provision 197 to the following entries in the HMT to outline thermal stability testing requirements for their transportation:

- UN2555, Nitrocellulose with water *with not less than 25 percent water, by mass*
- UN2556, Nitrocellulose with alcohol *with not less than 25 percent alcohol by mass, and with not more than 12.6 percent nitrogen, by dry mass*
- UN2557, Nitrocellulose, *with not more than 12.6 percent nitrogen, by dry mass* mixture with *or* without plasticizer, with *or* without pigment
- UN3380, Desensitized explosives, solid, n.o.s.

PHMSA received an anonymous comment on the proposal to add Special Provisions 196 and 197 for nitrocellulose products. These special provisions are intended to ensure nitrocellulose products are tested to verify they meet specific stability requirements to avoid the danger of self-ignition during transportation. The commenter notes that the special provisions state “[t]he nitrocellulose must meet the criteria of the Bergmann-Junk test or methyl violet paper test in the UN Manual of Tests and Criteria, Appendix 10 (IBR, see § 171.7 of this subchapter).” The commenter supports these revisions and believes they will ensure that Class 1 and Class 4 nitrocellulose products are tested to verify that the materials meet specific stability requirements to avoid the danger of self-ignition during transportation.

However, the anonymous commenter asserts that the stability of nitrocellulose is highly dependent upon storage conditions, and such testing at the time of manufacture does not necessarily guarantee stability during transportation (i.e., transportation might happen a significant time after manufacturing and testing has occurred). Therefore, the commenter believes the text of Special Provisions 196 and 197 should additionally include a time criterion for testing nitrocellulose products to indicate how recently the testing for stability occurred. The commenter acknowledges that any time frame identified would require a discretionary evaluation of risks by PHMSA. However, even such discretionary decision-making would help ensure nitrocellulose products that may have decreased stability since testing are not put into transportation.

PHMSA notes that in discussions at UN subcommittee meetings, the Bergmann-Junk or methyl violet paper tests were compared to the normal thermal stability test. The overall conclusion was that the Bergmann-Junk or methyl violet paper tests did a better job in determining whether remaining nitric acids had been properly washed away during manufacture. If the acids are properly washed away during manufacture (as verified by the testing) the materials are unlikely to destabilize with time. PHMSA therefore

understands that there should be low risk for future breakdown due to excess acids over time such as during storage. PHMSA further notes that the commenter's assumption that HMR requirements should address the low risk of these nitrocellulose products degrading over time is in tension with the HMR's approach regarding other hazardous materials of similar classification. For example, the current classification scheme in the HMR requires thermal stability testing before explosives are approved for transportation, but it does not explicitly require batch-specific testing every time a new shipment is made. The HMR places the responsibility on the manufacturer or offeror to ensure each batch is the same as the formulation that was approved. This means manufacturer or offeror often conducts a variety of tests on each batch for quality assurance purposes. Similarly, the classification scheme in the HMR makes no guarantees that materials approved for transportation can be stored for extended periods of time in any possible condition before subsequent transportation under their original approval. The HMR places responsibility on the offeror to ensure that their material has not decomposed or destabilized over time prior to transportation. Additionally, the burden lies with the offeror to ensure that the material does not need to be reclassified. Lastly, explosives that are known to be unstable or no longer meet the acceptance criteria would be considered forbidden explosives under § 173.54. Therefore, PHMSA does not agree with the commentor that a time frame is necessary for the stability testing required by Special Provisions 196 and 197.

Special Provision 360:

PHMSA is assigning Special Provision 360 to the following HMT entries:

- UN3481, Lithium ion batteries, contained in equipment or packed with equipment *including lithium ion polymer batteries*
- UN3091, Lithium metal batteries, contained in equipment or packed with equipment *including lithium alloy batteries*

Special Provision 360 instructs that vehicles only powered by lithium batteries must be assigned the identification number UN3171. *See* SECTION 172.102 SPECIAL PROVISIONS for further discussion of Special Provision 360.

Special Provision 387:

PHMSA is assigning Special Provision 387 to the HMT entry for “UN2522, 2-Dimethylaminoethyl methacrylate.” Special Provision 387 provides additional instructions for hazardous materials stabilized by chemical or temperature controls to ensure a level of stabilization prior to transportation sufficient to prevent the material from dangerous polymerization. The rationale for this change is discussed further below.

Portable Tank Special Provisions:

PHMSA is removing and reserving Special Provisions TP39 and T41 for the PG II entry for “UN2381, Dimethyl disulfide” and the PG I entry for “UN3148, Water-reactive liquid, n.o.s.” respectively, as the transition period for continued use of certain portable tanks has expired. In the HM-215L final rule,²⁰ PHMSA added Special Provisions TP39 and TP41 to provide more time for portable tank transporters to transition their fleets in compliance with portable-tank specific requirements in Special Provisions T4 and T9. Special Provision TP39 authorized continued use of portable tank requirements in Special Provision T4 until December 31, 2018. Special Provision TP41 authorized the continued use of portable tank instruction T9 until December 31, 2018. Since that date has passed, TP39 and TP41 are no longer necessary.

Column (9) Quantity Limitations

Section 172.101(j) explains the purpose of column (9) in the HMT. Column (9) specifies quantity limitations for packages transported by air and rail. Column (9) is divided into two columns: Column (9A) provides quantity limits for passenger

²⁰ 78 FR 987 (Jan. 1, 2013).

aircraft/rail; and column (9B) provides quantity limits for cargo aircraft. The revisions only address transportation by aircraft, as the UNMR did not contemplate any changes to the limitations for transportation via rail.

The ICAO Technical Instructions have added provisions allowing “UN2216, Fish meal, stabilized *or* Fish scrap, stabilized” to be transported by aircraft when also meeting the provisions of ICAO Special Provision A219. Consistent with the ICAO Technical Instructions, PHMSA is amending Column 9 for this entry to indicate quantity limits for passenger and cargo aircraft of 100 kg and 200 kg, respectively.

As a conforming amendment, PHMSA also revises the § 173.218 packaging requirements for fish meal and fish scrap to reflect the authorization to transport this material by aircraft in addition to vessel. *See* SECTION 173.218 of the Section-by-Section Review of Amendments for further detail.

Column (10) Vessel Stowage

Section 172.101(k) explains the purpose of Column (10) of the HMT and prescribes the vessel stowage and segregation requirements for specific entries. Column (10) is divided into two columns: Column (10A) [Vessel stowage] specifies the authorized stowage locations on board cargo and passenger vessels; and Column (10B) [Other provisions] specifies special stowage and segregation provisions.

In Column (10A) for the entry for “UN3135, Water-reactive solid, self-heating, n.o.s., PG I,” consistent with the IMDG Code, PHMSA is amending the assigned stowage category from “E” to “D.” This revision means the material must be stowed “on deck only” on a cargo vessel or on a passenger vessel carrying a number of passengers limited to the greater of 25 passengers total or one passenger for each 3 meters of overall vessel length; transport is prohibited on a passenger vessel in which those passenger limits have been exceeded. Stowage category “E” is currently assigned to this material which allows

“under deck” storage. The IMDG Code previously only authorized this material for transportation with the approval of the competent authority through the application of Special Provision 76. The IMDG Code has removed this special provision and the associated approval requirement and provided all necessary transport provisions for this commodity. This revision is consistent with the stowage category for other Division 4.3, PG I, materials with subsidiary hazards that are also assigned stowage category “D” for “on deck only” stowage and the IMDG Code assigned stowage category. For the “UN2900, Infectious substances, affecting animals *only*” and “UN2814, Infectious substances, affecting humans,” PHMSA is amending the assigned stowage category from “B” to “E.” This revision allows “on deck” or “under deck” stowage but does not allow stowage onboard when the number of passengers exceeds 25. This revision aligns with the IMDG Code assignment of this stowage category to these materials and is not expected to materially change the nature of authorized transport options for these materials.

Additionally, consistent with revisions to the IMDG Code, PHMSA makes numerous revisions to the special stowage and segregation provisions indicated in column (10B) of the HMT, labeled “other provisions.” PHMSA is assigning stowage code 52, which requires stowage “separated from” acids, to several entries in the HMT that are in a group of chemicals called alcoholates. Segregation from acids is currently not required by the HMR for these materials. However, alcoholates are strong alkaline substances that react vigorously with acids. Stowage code 52 is assigned to the following HMT entries:

- UN1289, Sodium methylate solutions *in alcohol*
- UN1431, Sodium methylate
- UN3206, Alkali metal alcoholates, self-heating, corrosive, n.o.s.
- UN3274, Alcoholates solution, n.o.s., *in alcohol*

For the entries “UN2900, Infectious substances, affecting animals *only*” and “UN2814, Infectious substances, affecting humans,” PHMSA is adding stowage codes 13 and 95 and new stowage code 155. Stowage codes 13 and 95 require keeping material as dry as reasonably practicable and stowage “separated from” foodstuffs. The IMDG Code has varying levels of stowage either “away from” or “separated from” foodstuffs depending on the type of shipment (e.g., containerized or break-bulk). PHMSA is adding the more restrictive “separated from,” regardless of the type of shipment. The stowage of these materials separated from foodstuffs is expected to prevent inadvertent cross contamination of foodstuffs. New stowage code 155 requires vessel carriers to keep handling of the packages to a minimum and to inform the appropriate public health authority or veterinary authority where persons or animals may have been exposed to the package contents. Additionally, this handling restriction and communication requirement may facilitate reducing exposure and contact tracing surrounding UN2814 packages that contain COVID-19 materials. Except for the general “separated from” language, these revisions are consistent with IMDG Code requirements.

Additionally, for the PG III entry of “UN3129, Water-reactive liquid, corrosive, n.o.s.,” and for the PG II and III entries for “UN3132, Water-reactive solid, flammable, n.o.s.,” and “UN3135, Water-reactive solid, self-heating, n.o.s.,” which are all water reactive Division 4.3 materials, PHMSA is adding stowage code 85 to column (10B). Stowage code 85 requires “under deck” stowage in mechanically ventilated spaces. This revision is intended to ensure that if the cargo is stowed under deck, adequate mechanical ventilation is provided. Mechanical ventilation is important to ensure any potentially dangerous gases or vapors released are expelled from the cargo hold and not allowed to build up below deck.

PHMSA adds stowage code 156 to the lithium battery entries “UN3090, Lithium metal batteries,” “UN3091, Lithium metal batteries contained in equipment, or Lithium

metal batteries packed with equipment,” “UN3480, Lithium ion batteries,” and “UN3481, Lithium ion batteries contained in equipment or Lithium ion batteries packed with equipment” in the HMT in column (10B). This new stowage code assignment requires that, in lieu of the stowage category A assigned in column (10A) in the current HMR which allows stowage “on deck” or “under deck,” lithium batteries that are offered in transportation for purposes of disposal or recycling, or that are offered under damaged, defective, or recalled provisions (*see* § 173.185(f) of the HMR), are required to be stowed in accordance with stowage category C which requires “on deck only” stowage on cargo and passenger vessels. PHMSA expects that this new stowage code will enhance the safety of shipment of lithium batteries expected from anticipated increases in use of lithium batteries in the transportation and other economic sectors in the years ahead. PHMSA received a comment from MDTC in support of this proposal.

PHMSA adds stowage code 157 to column (10B) for numerous entries in the HMT. Stowage code 157 requires aerosols, small receptacles containing gas, or gas cartridges transported for purposes of recycling or disposal, to be stowed in accordance with stowage category C, which requires “on deck only” stowage, and be clear of living quarters. This stowage code requirement is in lieu of the stowage category A assigned in column (10A) in the current HMR allowing “on deck” or “under deck” stowage.

PHMSA adds new stowage code 157 to the following entries in the HMT:

- UN1950, Aerosols, *corrosive, Packing Group II or III, (each not exceeding 1 L capacity)*
- UN1950, Aerosols, *flammable, (each not exceeding 1 L capacity)*
- UN1950, Aerosols, flammable, n.o.s. (*engine starting fluid*) (*each not exceeding 1 L capacity*)
- UN1950, Aerosols, *non-flammable, (each not exceeding 1 L capacity)*
- UN1950, Aerosols, *poison, Packing Group III (each not exceeding 1 L capacity)*

- UN2037, Gas cartridges, *(flammable) without a release device, non-refillable*
- UN2037, Receptacles, small, containing gas or gas cartridges *(flammable) without release device, not refillable and not exceeding 1 L capacity*
- UN2037, Receptacles, small, containing gas or gas cartridges *(non-flammable) without release device, not refillable and not exceeding 1 L capacity*
- UN2037, Receptacles, small, containing gas or gas cartridges *(oxidizing), without release device, not refillable and not exceeding 1 L capacity*

Section 172.102 Special Provisions

Section 172.102 lists special provisions applicable to the transportation of specific hazardous materials. Special provisions contain various provisions including packaging requirements, prohibitions, and exceptions applicable to particular quantities or forms of hazardous materials. PHMSA is making the following revisions to the special provisions in this section:

Special Provision 47

Special Provision 47 allows mixtures of solids that are not subject to the HMR and Class 3 flammable liquids to be transported as flammable solid material described as “UN3175, Solids containing flammable liquid, n.o.s., 4.1,” without applying the Division 4.1 classification criteria. This classification is permitted provided that there is no free liquid visible at the time the material is loaded or at the time the packaging is closed. In addition to providing classification testing relief for these items, this special provision provides further relief from the HMR for packets and articles, generally referred to as small inner packagings, if they contain less than 10 mL of a Class 3 liquid (in Packing Group II or III) and if the liquid is absorbed (i.e., no free liquid in the packet or article) onto a solid material. This special provision is widely used for articles such as alcohol wipes, and due to the ongoing COVID-19 public health emergency, these items are being

transported in increasing numbers to meet demand. While many of these wipes, depending on how they are packed, meet the conditions of this special provision and qualify for exception from regulation, confusion around the wording of the packaging conditions to qualify for the exception has led to an editorial amendment in the ICAO Technical Instructions.

On December 31, 2020, in an addendum to the 2021-2022 edition of the ICAO Technical Instructions, Special Provision A46 was amended to remove a reference to “small inner packaging” related to the sealed packets and articles. Prior to this amendment—and as currently provided in the HMR in Special Provision 47—it reads that to be excepted from the HMR, “small inner packagings consisting of sealed packets and articles containing less than 10 mL of a Class 3 liquid in Packing Group II or III absorbed onto a solid material are not subject to this subchapter provided there is no free liquid in the packet or article.” The phrasing is ambiguous enough that shippers may misinterpret the language as instructing them to pack small inner packagings with the sealed packets or articles. Instead, the intent of “small inner packagings” was to describe sealed packets and articles. The amendment to Special Provision A46 in the ICAO Technical Instructions is consistent with other provisions in the ICAO Technical Instructions; for example, Special Provision A158 clearly states that sealed packets and articles containing less than 10 mL of an environmentally hazardous liquid are not subject to the requirements when certain conditions are met. PHMSA agrees with the amendment made in the ICAO Technical Instructions removing the reference to “small inner packagings” to avoid confusion and makes the same revision in Special Provision 47 to clarify the exception within the HMR. PHMSA expects this clarification will facilitate the transport of hygienic products intended to prevent the spread of COVID-19.

Special Provision 134 provides instruction on the use of the HMT entry “UN3171, Battery-powered vehicle *or* Battery-powered equipment,” stipulating that it applies only to vehicles or equipment powered by wet batteries, sodium batteries, lithium metal batteries, or lithium ion batteries that are transported with these batteries installed. PHMSA amends language in Special Provision 134 to clarify its use in connection with lithium batteries installed in cargo transport units. Under this amendment, these items are described by a separate entry in the HMT, specifically, “UN3536, Lithium batteries installed in cargo transport unit” for which there are unique transportation requirements that do not apply to transport of battery-powered vehicles or equipment. PHMSA also amends the language in this special provision to replace the phrase “consigned under” with the phrase “described using” to provide a more easily-accessible, plain language understanding of the requirement. These amendments will clarify the requirements for packaging, marking, and transport of lithium batteries and ensure safe transport.

Special Provision 135

Special Provision 135 provides instruction for selecting the appropriate proper shipping name for vehicles with internal combustion engines powered by various fuel sources, such as a flammable gas, flammable liquid, or fuel cell. PHMSA amends Special Provision 135 to specify that lithium batteries installed in cargo transport units (UN3536), which are designed only to provide power external to the transport unit, may not be classified as an internal combustion engine installed in a vehicle. PHMSA expects that adding this clarifying language will avoid misclassifying lithium batteries in cargo transport units. Additionally, consistent with revisions to Special Provision 134, PHMSA amends the language in this special provision to replace the phrase “consigned under” with the phrase “described using” to the entries to provide consistency across similar provisions and improve understanding of the requirement.

Special Provision 136

Special Provision 136 provides instructions regarding the use of the HMT entry “UN3363, Dangerous Goods in Apparatus *or* Dangerous Goods in Machinery” and indicates that this UN number and the associated proper shipping names are only applicable to machinery and apparatus containing hazardous materials as an integral element of the machinery or apparatus. In light of the addition of “Dangerous Goods in Articles” to the list of acceptable proper shipping names for UN3363 (*see* § 172.101 of the Section-by-Section Review of Amendments), PHMSA revises this special provision to add the words “articles” where machinery and apparatus are mentioned. PHMSA expects this revision to improve consistency across HMR provisions where UN3363 is discussed, thus enhancing safety.

Special Provision 147

Special Provision 147, assigned to UN3375, provides instruction on the description and classification criteria for non-sensitized emulsions, suspensions, and gels consisting mostly of ammonium nitrate and fuel, intended to produce a Type E blasting explosive only after further processing prior to use, which are transported as “UN3375, Ammonium nitrate emulsion *or* Ammonium nitrate suspension *or* Ammonium nitrate gel, intermediate for blasting explosives.” Currently, the HMR requires applicants to pass Test Series 8(a), (b), and (c) of the UN Manual of Tests and Criteria, when requesting an approval for transportation under UN3375. However, PHMSA is revising the last sentence of Special Provision 147 by removing the specific requirement to pass Tests 8(a), (b), and (c), so that eligible materials can pass Test Series 8(e) in lieu of 8(c) of the UN Manual of Tests and Criteria. Modifying Special Provision 147 will align with the equivalent special provision in the UNMR (SP 309) which was amended similarly. PHMSA makes this revision to reflect and allow for the inclusion of an additional test in the Test Series 8 provided in the UN Manual of Tests and Criteria. In the 7th revised edition UN Manual of Tests and Criteria Test Series 8 was expanded to include Test 8(e)

as an alternative to 8(c). This change in testing was the result of technical discussions and amendment proposals held during UNSCOE meetings. At the 47th session of the United Nations Sub-Committee of Experts on the Transport of Dangerous Goods, the EWG concluded that the UN Test 8(c) may be unsuitable for some ammonium nitrate emulsions which could lead to a false positive under certain conditions.²¹

PHMSA expects that removing this requirement to specifically pass the 8(c) test and alternatively pass the 8(e) test will reduce the risk of receiving a false positive result and consequently inaccurate classification. It also allows shippers the ability to perform additional classification testing as provided in the 7th revised edition of the UN Manual of Tests and Criteria.

Special Provisions 196 and 197

PHMSA is adding Special Provisions 196 and 197 pertaining to transportation of nitrocellulose. These new special provisions require that manufacturers of nitrocellulose products ensure that these Class 1 and Class 4 materials employ certain tests verifying that the materials meet specific stability requirements to avoid the danger of self-ignition. Those test methods determine whether a material is stable when subjected to elevated temperatures in transportation, which is critical to the safe transportation of materials such as nitrocellulose. Special Provision 196 applies to nitrocellulose materials in Class 1 (UN0340, UN0341, UN0342, and UN0343), and specifically excepts those materials from Type 3(c) thermal stability testing. Special Provision 197 is assigned to nitrocellulose materials in Class 4 (UN2555, UN2556, UN2557, and UN3380).

Special Provision 360

Special Provision 360 provides instruction to aid in proper identification of a battery-powered vehicle that contains lithium batteries. Currently, Special Provision 360 states that vehicles powered solely by lithium batteries must be identified as “UN3171,

²¹ <https://unece.org/fileadmin/DAM/trans/doc/2018/dgac10c3/UN-SCETDG-53-INF22e.pdf>

Battery-powered vehicle *or* Battery-powered equipment.” In the HM-2150 final rule, PHMSA added a new UN entry, “UN3536, Lithium batteries installed in cargo transport unit *lithium ion batteries or lithium metal batteries.*” PHMSA is revising Special Provision 360 to better distinguish between the various types of equipment with lithium batteries. The revised language specifies that lithium batteries that are installed in cargo transport units which are designed only to provide power external to the transport unit must be transported as “UN3536, Lithium batteries installed in a cargo transport unit *lithium ion batteries or lithium metal batteries,*” making them subject to packaging provisions and exceptions outlined in Special Provision 389. The intent of this language is to clarify further that these batteries should not be described and transported as “UN3091, Lithium metal batteries, contained in equipment *including lithium alloy batteries*” or “UN3481, Lithium ion batteries, contained in equipment *including lithium ion polymer batteries.*”

Furthermore, Special Provision 360 was originally assigned to the HMT entry “UN3091, Lithium batteries, contained in equipment,” however, in final rule HM-224F,²² PHMSA adopted separate entries based on the lithium battery chemistry, i.e., “UN3091, Lithium metal batteries, contained in equipment *including lithium alloy batteries*” or “UN3481, Lithium ion batteries, contained in equipment *including lithium ion polymer batteries.*” In doing so, PHMSA inadvertently did not make a conforming revision to assign Special Provision 360 to these separate descriptions in the HMT. Consistent with the revisions to Special Provision 360 to clarify appropriate use of descriptions for lithium battery equipment, PHMSA is assigning this special provision to the two lithium battery descriptions for contained in equipment and packed with equipment. Finally, PHMSA is also revising the text “assigned to” to read “described using” to improve

²² 79 FR 46012 (Aug. 16, 2014).

understanding of the special provision instruction. In response to this proposal in the NPRM, COSTHA provided a comment in support of this revision.

Special Provision 370

Special Provision 370 is currently assigned to “UN0222, Ammonium nitrate, *with more than 0.2 percent combustible substances, including any organic substance calculated as carbon, to the exclusion of any other added substance.*” The entry UN0222 (1.1D) is intended for certain ammonium nitrates that are not a commercially manufactured product and this entry is typically used to identify contaminated ammonium nitrate or ammonium nitrate fertilizers that give a positive result when tested in accordance with Test Series 2 of the UN Manual of Tests and Criteria. However, Special Provision 370 currently states that a hazardous material may also be classified as UN0222 even if it has more than 0.2 percent combustible substances. PHMSA amends special provision 370 to better clarify when the entry for UN0222 may be applied. Clarifying this classification instruction is necessary to ensure that more readily transported materials—such as ammonium nitrate mixed with fuel oil (ANFO)—are not improperly transported as UN0222, which should be reserved for special non-commercial purposes. Given that inappropriately classified items pose an inherent safety risk to emergency responders, PHMSA revises Special Provision 370 to provide clarifying language to ensure that certain ammonium nitrate materials (such as ANFO) are not described and classified as “UN0222, Ammonium nitrate.” Specifically, the amendment to this special provision stipulates that this UN entry should not be used when other applicable proper shipping names exist.

Special Provision 379

Special Provision 379 provides conditions for exception from full regulation under the HMR for anhydrous ammonia adsorbed or absorbed on a solid contained in ammonia dispensing systems or receptacles intended to form part of such systems.

Among these conditions, Special Provision 379 requires that receptacles containing adsorbed or absorbed ammonia must be made of a material compatible with ammonia as specified in ISO 11114-1:2012(E), “Gas cylinders — Compatibility of cylinder and valve materials with gas contents — Part 1: Metallic materials.” PHMSA revises language in Special Provision 379 to add a reference to an amendment to ISO standard 11114-1:2012(E), specifically, ISO 11114-1:2012/Amd 1:2017(E) and correct the unintentional omission of the (E) to indicate the English language edition. As part of ISO’s regular five-year review of its standards, the 2012 version of this document was amended through the issuance of document ISO 11114-1:2012/Amd 1:2017(E). The amended ISO standard provides more explicit instructions on the permissible concentrations of gases containing halogens in aluminum cylinders. It also provides amended requirements for butylene, hydrogen cyanide, hydrogen sulfide, and nitric oxide. Consequently, the 21st revised edition of the UNMR updated all references to the 2012 edition to include a reference to the amendment (ISO 11114-1:2012/Amd 1:2017(E)). PHMSA makes similar conforming revisions. *See* SECTION 171.7 Section-by-Section Review of Amendments discussion. In the course of its review of the 2017 amendment for ISO standard 11114, PHMSA determined that it enhances safety of transport and therefore, is appropriate for inclusion as an updated condition for transport of ammonia dispensing systems or receptacles intended to form part of such systems.

Special Provision 430

PHMSA adds Special Provision 430 and assigns it to the new HMT entry “UN3549, Medical Waste, Category A, Affecting Humans, *solid or* Medical Waste, Category A, Affecting Animals *only, solid*” discussed above. As with other special provisions that provide instruction pertaining to appropriate use of proper shipping names, PHMSA is adding Special Provision 430 to stipulate that only solid medical waste of Category A, which is being transported for disposal, may be described using this entry.

The intent of this added language is to simplify the regulations and ensure proper classification of medical wastes to ensure safe transportation.

Special Provision 441

The UNMR and the IMDG Code contain an exception in their Special Provision 274 pertaining to “UN3077, Environmentally hazardous substance, solid, n.o.s.” and “UN3082, Environmentally hazardous substance, liquid, n.o.s.” Special Provision 274 requires a proper shipping name to be supplemented with a technical name, in the same manner as the letter “G” is assigned in the HMT. When a “G” is listed in Column (1) of the HMT in association with a particular entry, the proper shipping name must be supplemented with a technical name. For context, in both the UNMR and the HMT, when generic proper shipping names are used—e.g., n.o.s. proper shipping names—a technical name must be provided as part of the basic description to provide additional information for hazard communication related to the material being shipped. For example, the HMT entry “UN1760, Corrosive liquid, n.o.s.,” provides a generic description of a corrosive liquid and, therefore, marking and shipping papers requirements necessitate a technical name pertaining to the corrosive liquid (e.g., octanoyl chloride).

The new exception in Special Provision 274 modifies the requirement to supplement the proper shipping name with a technical name. The revision, which is specifically for materials shipping under UN3077 or UN3082, allows the use of a proper shipping name found on the Dangerous Goods List (the IMDG Code and UNMR’ equivalent of the HMT) to be used in place of a technical name, provided that it does not: (1) include “n.o.s.” as part of the proper shipping name and; (2) is not an entry assigned Special Provision 274. In practice, this means that items, such as paint, that might be shipped as “UN3082, Environmentally hazardous substance n.o.s.,” are no longer required to include a supplemental technical name, and instead are permitted to include

the more readily-recognizable name of the commodity (paint) on markings and shipping papers. For common commodities such as paint with various chemical components, emergency responders rely less on determining the specific chemical for performance of emergency response and respond to the known hazards of the commodity. PHMSA expects streamlining the hazardous material description requirements in this manner will help facilitate appropriate emergency response without a reduction in safety.

While the UNMR broadly provided this relief for UN3077 and UN3082, environmentally hazardous materials classified under these UN numbers are applicable to a narrower scope of materials under the IMDG Code. Under the IMDG Code, “environmentally hazardous substances” are those that are pollutants specifically for aquatic environments (which is equivalent to marine pollutants under the HMR) whereas the UNMR are broadly applicable to aquatic and other environments.

PHMSA is mirroring the expansion by the UNMR and IMDG Code’s Special Provision 274 of acceptable technical names for marine pollutants transported under UN3077 and UN3082 by adding a new Special Provision 441 to the HMR. This special provision provides the same shipping description flexibility specifically for marine pollutants by removing the requirement to supplement the proper shipping name associated with UN3077 and UN3082 with a technical name. PHMSA is also modifying §§ 172.203(l) and 172.322 to maintain alignment with the IMDG Code with regard to the documentation and marking requirements when marine pollutant components are present in hazardous materials. In addition to providing logistical benefits for shippers, PHMSA expects that the use of readily recognizable common commodity names instead of technical names will facilitate emergency response by making the hazardous material more quickly and easily identifiable. *See* §§ 172.203(l) and 172.322 of the Section-by-Section Review of Amendments for additional discussions on revisions related to this amendment.

Special Provisions TP39 and TP 41

PHMSA is removing and reserving portable tank special provisions TP39 and TP 41. The sunset provisions in special provisions TP39 and TP41 allowing use of other portable tank special provisions expired on December 31, 2018, and thus, PHMSA removes them from the HMR to prevent the use of these expired provisions. *See* § 172.101 of the Section-by-Section Review of Amendments for further detail of the deletion of these portable tank special provisions from the HMR.

Section 172.203

Section 172.203 prescribes additional description requirements for shipping papers. PHMSA is revising paragraphs (i)(2) and (l)(1) and adding new paragraphs (i)(4) and (q). Each revision is further described below, along with PHMSA's rationale for the revisions.

In paragraph (i), which provides requirements specific to vessel transportation, PHMSA is clarifying that the documentation of the flashpoint on shipping papers, as required in paragraph (i)(2), is only required for liquid hazardous materials that have a primary or subsidiary hazard of Class 3 and a flashpoint of 60°C or below (in °C closed-cup (c.c.)). This revision aims to prevent the shipping delays resulting from confusion on how this documentation requirement applies to items for which flashpoint is not an appropriate classification criterion (e.g., aerosols and flammable solids). Furthermore, limiting the flashpoint information to a narrower subset of hazardous materials ensures identifying information of the materials in transport better aligns with the material properties of those materials because flashpoint is a safety-relevant criterion only for hazardous materials that are liquids with a main or subsidiary hazard of Class 3. PHMSA does not expect any reduction in safety as a result of this editorial revision given that this revision ensures that information regarding the flashpoint is only provided for items in

which flashpoint is a safety-relevant criterion; avoidance of the delays in transportation experienced in the past also reduces the risks associated with that transportation.

PHMSA received comments in response to the NPRM from DGAC and Dow in support of this revision.

PHMSA is also adding a new paragraph (i)(4), that requires shipments of lithium batteries that are offered into transportation for purposes of disposal or recycling or offered under the damaged or defective provisions in § 173.185(f), to indicate on shipping papers one of the following disclaimers, as appropriate:

“DAMAGED/DEFECTIVE,” “LITHIUM BATTERIES FOR DISPOSAL,” or “LITHIUM BATTERIES FOR RECYCLING.” This revision is consistent with revisions adopted in the IMDG Code and associated with an additional revision to § 176.84 of the HMR to require lithium batteries that are damaged or defective—or those that are being transported for disposal or recycling—to be stowed in accordance with stowage category C requirements authorizing “on deck only” stowage instead of the currently-authorized “on deck” or “under deck” options. This additional shipping paper requirement helps communicate information about the batteries to individuals making stowage plans for the vessel, provide a mechanism for ensuring the “on deck” stowage of these materials, and allow for more easily identifiable and effective response actions in the event of a fire involving lithium batteries onboard a vessel. PHMSA expects that these revised shipping requirements will contribute to the safe transportation of increased volumes of damaged/defective/recycled lithium batteries anticipated as a result of the increased use of lithium batteries in the transportation and other economic sectors. PHMSA received comments from DGAC, Dow, and MDTC in support of this revision. For additional information on this stowage requirement, *see* SECTION 176.84 of the Section-by-Section Review of Amendments.

In paragraph (l)(1), PHMSA is revising the scope of hazardous materials for which a specific marine polluting component must be identified in association with the basic description—i.e., the combination of the UN number, proper shipping name, hazard class, and packing group—on a shipping paper. Currently, § 172.203(l) specifies that, when the proper shipping name for a hazardous material which is a marine pollutant does not identify the component that makes the hazardous material a marine pollutant, the name of the marine pollutant constituent must appear in parentheses within the basic description. PHMSA revises paragraph (l)(1) to limit the scope of this requirement to make it applicable only to generic HMT entries (as indicated by the G in Column 1 on the HMT) as well as those that have “n.o.s.” as part of the proper shipping name. The intent of this amendment is to extend the documentation and marking flexibility provided by Special Provision 441 (which currently applies only to environmentally hazardous substances (UN3077 and UN 3082)) and to other hazardous materials that may contain component(s) that are marine pollutants. For example, under the current HMR, if “UN1263, Paint” contains marine pollutants, the basic description required on shipping papers and markings have to include the specific marine polluting component(s) that are present in the paint, in addition to the words “marine pollutant” (e.g., “UN1263, Paint, 3 (propyl acetate, di-n-butyltin di-2-ethylhexanoate) MARINE POLLUTANT”). But under this amendment, the basic description for “UN1263, Paint” no longer require the addition of the “marine pollutant” language. Given that emergency responders do not depend on the specific technical name provided in association with the shipping description to effectively respond to emergencies, PHMSA expects streamlining the description to provide more readily recognizable and usable information that reflects the hazardous materials involved may facilitate emergency response. PHMSA received a comment from DGAC in support of this revision.

Finally, PHMSA is adding a new paragraph (q) to this section to require documentation of the holding time for refrigerated liquefied gases transported in portable tanks. Holding time is the span of time, as determined by testing, that elapses from the time of loading until the pressure of the contents, under equilibrium conditions, reaches the set point for the lowest pressure control valve or pressure relief valve setting. PHMSA will require including the specific date when the holding time ends on the shipping paper for refrigerated liquefied gases transported in portable tanks. Knowing the holding time assists in preventing unexpected venting while in transportation, which could lead to exposure to a hazardous material release, and associated risks, as well as the loss of product. Including this information on the shipping paper aids in managing the transportation of refrigerated liquefied gases to ensure the material arrives safely at its destination without an unintended release of hazardous materials, including those that are known GHGs (e.g., nitrous oxide). PHMSA anticipates that establishing this requirement to provide this information for portable tanks will improve safety and decrease climate change impacts of international transport of refrigerated liquefied gases in portable tanks. DGAC provided a comment in support of this revision.

Section 172.301

Section 172.301 prescribes general marking requirements for non-bulk packagings. PHMSA is amending paragraph (a)(1) to clarify that the exception permitting reduced size marking requirements are applicable to packages with either 5 L or less capacity, or those with a 5 kilograms (kg) or less net mass. The current HMR text states that the exception is applicable to packages with a maximum capacity of 5 kg or 5 L or less, rather than the maximum net mass, which is the more appropriate measure for packages containing solids. A person shipping a solid material may unnecessarily apply the volume limitation when a net mass limit is intended. This revision clarifies that

packages for solid material may have a maximum net mass of 5 kg or less. This editorial revision is intended to reduce confusion over the application of the exception at § 172.301(a)(1) in that for solid materials, the quantity limit is based on the net amount of solid material and not the capacity of the packaging the material is placed in. This clarification is consistent with similar provisions for solids (net mass) and liquids (capacity) throughout the HMR. Ensuring the appropriate application of the reduced size marking allowance provides consistency across persons using the reduced-size marking and therefore, is expected to improve safety of transport. PHMSA received a comment from DGAC in support of this revision.

Section 172.315

Section 172.315 prescribes the marking requirements for packages of limited quantities. Currently, the HMR require that the limited quantity mark be applied on at least one side or one end of the outer packaging. The 2021-2022 ICAO Technical Instructions clarified that marks, in particular those that are applied in a similar manner to self-adhesive labels, must be applied on one side of a package (i.e., not folded over an edge). Prior to these amendments, only hazard communication labels were required to be applied to a single side of a package and prohibited from being folded around the edge of a package. This requirement was extended to markings to ensure visibility and to communicate hazard(s) to the greatest extent possible. Consistent with the ICAO Technical Instructions, PHMSA is adding a new paragraph (b)(3) to require that—for air transport—the entire limited quantity mark must appear on one side of the package. PHMSA received a comment from DGAC in support of this revision. For detail on the rationale for this requirement, *see* SECTION 172.406 of the Section-by-Section Review of Amendments.

Section 172.322

Section 172.322 prescribes the marking requirements for hazardous materials that are also marine pollutants. Consistent with revisions in Special Provision 441 and § 172.203(l)(1) discussed above, PHMSA is limiting the scope of hazardous materials which are marine pollutants, that are subject to this technical name marking requirement. Specifically, PHMSA applies the technical name marking to proper shipping names that have a “G” assigned in column (1) of the § 172.101 Hazardous Materials Table or have the text “n.o.s.” as part of the proper shipping name. PHMSA also adds language directing shippers using “UN3077, Environmentally hazardous substance, solid, n.o.s.” or “UN3082, Environmentally hazardous substance, liquid, n.o.s.” to Special Provision 441 for additional requirements.

Section 172.406

Section 172.406 specifies the requirements for the placement of labels on a package. The 2021-2022 ICAO Technical Instructions clarified that marks, in particular those that are applied in a similar manner to self-adhesive labels, must be applied on one side of a package. The ICAO Technical Instructions have long required that all hazard communication labels not be folded (around the edge of a packages) and be applied to a single side. This requirement was introduced to ensure visibility and communicate hazard(s) to the greatest extent possible. In a working group session, the ICAO Dangerous Goods Panel agreed that extending this labeling requirement to marks was appropriate as marks, like labels, provide hazard communication. While PHMSA has not specifically prohibited extending labels onto other sides of packaging and allows the use of smaller labels to accommodate smaller packagings, PHMSA appreciates the need for readily visible hazard communication by air. Therefore, for the sake of harmonizing with the ICAO Technical Instructions, and to ensure visibility to communicate hazards to the

greatest extent possible, PHMSA is adding specific restrictions on wrapping marks and labels for shipments that are transported by air.

During a review of the specific marking requirements that were added in the 2021-2022 ICAO Technical Instructions, PHMSA found that the HMR do not contain the same express limitation on “folding” a part of a label around the edges of a package such that the entirety of a label would have to be on a single side. PHMSA expects that adopting both the pre-existing ICAO single side requirement for labels, and the recent requirement that marks must be on a single side of a package will provide increased visibility of hazard communication on the smaller package types that are frequently used in air transport. These measures also reduce ambiguity for air operator employees conducting acceptance checks as to whether the package appropriately indicates the hazards without having to make a subjective determination.

Therefore, PHMSA is requiring in a new paragraph (a)(1)(iii), that for air transport, the entirety of a required label must be displayed on one side of a package. For cylindrical packages not containing a traditional side, the labels and/or package must be of such dimensions that a label would not overlap itself. In the case of cylindrical packages containing radioactive materials, which require two identical labels, these labels must be centered on opposite points of the circumference and must not overlap each other. If the dimensions of the package are such that two identical labels cannot be affixed without overlapping each other, one label is acceptable provided it does not overlap itself.

In addition, PHMSA adds requirements that marks must not be folded for: the limited quantity mark in § 172.315(b); the excepted quantity mark in § 173.4a(g); and the UN3373 Category B infectious substance mark in § 173.199(a). The ICAO Technical Instructions were also amended to require that the lithium battery handling mark be applied on a single side of a package; however, this is already prescribed in

§ 173.185(c)(3)(i), applicable to all modes of transport. Regarding the Category B infectious substance mark, the revision helps ensure that any packages containing COVID-19 materials have appropriate visibility and thus, ensure the safe transport of such materials.

Section 172.447

Section 172.447 prescribes specifications for labels used for lithium batteries. In this final rule, PHMSA removes and reserves paragraph (c), which contains an expired transitional exception allowing for continued use of labels in conformance with the requirements that had been in place on December 31, 2016, until December 31, 2018. Since December 31, 2018, has occurred, the continued use of an outdated label is no longer allowed.

C. Part 173

Section 173.4a

Part 173 contains general requirements for shippers regarding shipments and packagings. Section 173.4a prescribes transportation requirements for excepted packages. For consistency with the ICAO Technical Instructions, PHMSA is adding a new paragraph (g)(3) to require that—for air transport—the entire excepted quantity mark must be displayed on one side of the package. For detail on the rationale for this requirement, *see* SECTION 172.406 of the “V. Section-by-Section Review of Amendments” for discussion of the requirement to display a mark on a single side.

Section 173.14

In subpart A of Part 173, PHMSA adds a new section—§ 173.14—to provide exceptions from the HMR for certain devices or equipment containing hazardous

materials that are in actual use or which are intended for use during transport. Examples of such devices include cargo tracking devices and data loggers attached to, or placed in, packages, overpacks, containers, or load compartments. These items often contain component hazardous materials, such as lithium batteries or fuel cells, necessary to power the device or equipment. The exception provides clarity for these types of devices which are not offered into transportation as part of the consignment but instead accompany it to collect or disseminate information during transport. Eligibility for the exception is limited to equipment that meets conditional safety requirements. These include requirements that the component hazardous material—e.g., lithium batteries—meet the applicable construction and test requirements specified in the HMR, and that the equipment can withstand the shocks and vibrations normally encountered during transport. The equipment must also be safe for use in different environmental conditions that it may be exposed to during transport such as temperature variations, inclement weather, and conditions in which explosive atmospheres caused by gases, vapors, mists, or air/dust mixtures may occur. The text—slightly modified from the NPRM language—also clarifies that the exception is not applicable when this type of equipment is itself offered as cargo such that normal HMR requirements pertaining to packaging, shipping papers, marking, and labeling apply.

This new section is consistent with provisions adopted in the UNMR and the IMDG Code. Additionally—in response to the ongoing global COVID-19 public health emergency—on December 31, 2020,²³ and February 23, 2021,²⁴ ICAO published addenda to the 2021-2022 Edition of the ICAO Technical Instructions to provide a

²³ ICAO, Addendum No.1 to the 2021-2022 of the ICAO Technical Instructions for the Safe Transport of Dangerous Goods by Air (Dec. 31, 2020), <https://www.icao.int/safety/DangerousGoods/AddendumCorrigendum%20to%20the%20Technical%20Instructions/Doc%209284-2021-2022.AddendumNo1.en.pdf>

²⁴ ICAO, Addendum No.2 to the 2021-2022 of the ICAO Technical Instructions for the Safe Transport of Dangerous Goods by Air (Feb. 23, 2021), <https://www.icao.int/safety/DangerousGoods/AddendumCorrigendum%20to%20the%20Technical%20Instructions/Doc%209284-2021-2022.AddendumNo2.en.pdf>

limited exception for lithium battery-powered data loggers and cargo tracking devices to facilitate the transport and distribution of COVID-19 pharmaceuticals, including vaccines. Specifically, the 2021-2022 ICAO Technical Instructions except these devices from lithium battery marking and documentation requirements when transported by aircraft. Consequently, PHMSA is adopting exceptions in this section of the HMR to cover all modes of transportation for certain devices or equipment containing hazardous materials that are in actual use or which are intended for use during transport. However, the exceptions associated with aircraft transportation are limited to marking and documentation for lithium ion and lithium metal battery-powered devices or equipment that accompany shipments of COVID-19 pharmaceuticals, including vaccines.

PHMSA received comments from COSTHA, DGAC, MDTC, and PRBA expressing concerns over the new § 173.14. MDTC is concerned that § 173.14 as proposed is too limited and unnecessary. Additionally, DGAC, MDTC, and PRBA expressed concern that § 173.14 contradicts a letter of interpretation (LOI) that the industry has relied on for several years (i.e., LOI Ref. No. 15-0040). MDTC believes that § 173.14 might impact significant types of battery-powered equipment including medical devices such as hearing aids, defibrillators, and implantable devices that cannot be switched off completely during transportation.

COSTHA believes that the language as proposed in the NPRM appropriately addresses the intent of the international standard language that these devices are part of the packaging and supports adopting the provisions as drafted. PRBA generally supports PHMSA's intent to add § 173.14 to the HMR to provide exceptions for certain devices or equipment (e.g., cargo tracking devices) containing hazardous materials that are in actual use or are intended for use during transport.

In response to the comments from COSTHA, DGAC, MDTC, and PRBA, PHMSA confirms the intent of § 173.14 is not to capture those hazardous materials

within equipment being offered for transportation as part of a consignment (i.e., offered into commerce). This section does not apply to electronic devices (such as hearing aids that may always be powered on as part of their design) that are themselves being offered for transportation as cargo. Rather, these provisions are only applicable to devices containing hazardous materials that are in use to provide monitoring of packages during transit. Thus, in order to provide more clarification and better understanding of the intent of the section, PHMSA adds a paragraph (c) to clearly state that § 173.14 does not apply to hazardous materials with equipment that is itself shipped as cargo; rather, this exception only applies to equipment that incorporate a hazardous material as part of its operation such as data loggers used to track packages while in transit. Furthermore, PHMSA confirms that LOI Ref. No. 15-0040 remains valid and is not in conflict with this section.

Section 173.27

Section 173.27 provides the general requirements for transportation by aircraft. PHMSA is making a number of corrections and revisions as follows: (1) revise paragraph (c)(2) to clarify that all package types containing “UN3082, Environmentally hazardous substance, liquid, n.o.s.” are excepted from the pressure differential requirements and not only limited quantities; (2) revise paragraph (f) introductory text to clarify the inner packaging quantity limits prescribed in Table 1 and Table 2 apply to combination packages and not only to excepted quantity packages; (3) in paragraph (f)(3) Table 1 and Table 2 add inner package limits for certain Class 9 HMT entries consistent with the ICAO Technical Instructions; and (4) in Table 1 and Table 2 remove the “no limit” quantity limits and add them to the paragraph (f) introductory text for a clearer description of the requirement for materials authorized to exceed 220 L or 200 kg in accordance with columns (9A) and (9B) of the 172.101 table. Finally, the 2021-2022

edition of the ICAO Technical Instructions contains editorial corrections to exceptions for “UN3082, Environmentally hazardous substance, liquid, n.o.s.” from differential pressure testing requirements in Packing Instructions 964 and Y964 (limited quantity). When reviewing the clarifying editorial correction²⁵ to the ICAO exception, PHMSA found that although the same update is not needed in the HMR, the corresponding exceptions in § 173.27 are not consistent with those provided for in the latest version of Packing Instructions 964 and Y964. PHMSA is revising § 173.27 to correct this discrepancy and align with the updated version of the ICAO Technical Instructions.

In a previous final rule, HM-215K,²⁶ PHMSA revised § 173.27 to align with the amendments made to the 2011-2012 edition of the ICAO Technical Instructions. That earlier edition of the ICAO Technical Instructions had included exceptions applicable to “UN3082” from the pressure differential requirements in Packing Instructions 964 and Y964 for fully regulated and limited quantity packages. The exceptions were added because “UN3082” materials assigned to Class 9 do not meet the criteria for classification as any other hazard class or division and are classified as hazardous materials solely because of their risk to the environment (i.e., they are not capable of posing a risk to health, safety, or property when transported by air). When this exception was added by the HM-215K rulemaking, the text was placed in paragraph (f)(2)(vii), thereby inadvertently narrowing the exception to limited quantity materials. In the 2011-2012 edition of the ICAO Technical Instructions that the HM-215K rulemaking intended to align with, the exception from the pressure differential requirements applied to both combination packagings in PI 964 and limited quantity packagings in PI Y964. Therefore, to eliminate this inadvertent minor error created in 2011, PHMSA amends paragraph (c)(2) to except shipments of “UN3082, Environmentally hazardous substance,

²⁵ Report of the ICAO Working Group 19 (paragraph 3.2.11) (May, 2019), <https://www.icao.int/safety/DangerousGoods/WG19/DGPWG.19.WP.030.en.pdf>.

²⁶ 76 FR 3308 (Jan. 19, 2011).

liquid, n.o.s.” from the pressure differential packaging requirements applicable for transportation by aircraft. This revision aligns the pressure differential exceptions for “UN3082” material with those found in the ICAO Technical Instructions and excepts these shipments, in all authorized packaging types, from the pressure differential requirements in paragraph (c)(2).

Further, PHMSA amends paragraph (f), which specifies requirements for combination packagings intended for transportation aboard an aircraft. A combination packaging, for transport purposes, consists of one or more inner packagings secured in a non-bulk outer packaging. Paragraph (f)(3) contains Table 1 and Table 2 indicating the maximum net capacity allowed for the inner packagings of the combination packaging on passenger-carrying and cargo aircraft, respectively. PHMSA revises paragraph (f) by moving the references to Table 1 and Table 2 from paragraph (f)(1)—applicable to excepted quantities—to the paragraph (f) introductory text. The intent of this revision is to clarify that the inner packaging limits specified in paragraph (f)(3) Table 1 and Table 2 apply to all combination packages used to transport hazardous material by aircraft and not just to excepted packages (i.e., packages for which exceptions from certain provisions are provided in the HMR). As it currently reads, the instruction for all combination packagings is imbedded in the paragraph (f)(1), which outlines provisions for excepted packages, thus making it appear that Tables 1 and 2 apply only to excepted packages. Correcting the reference in paragraph (f) provides regulatory clarity by properly aligning packaging limits in the HMR with the ICAO Technical Instructions.

Additionally, the first column of Tables 1 and 2 provides the maximum net quantity per package from Column (9A) of the HMT. PHMSA is replacing the rows in Tables 1 and 2, noting that there are no maximum net capacity limits for quantities greater than 220 L for liquids and greater than 200 kg for solids with an instruction in the revised paragraph (f) introductory text conveying the same information.

Finally, PHMSA discovered that for certain Class 9 (miscellaneous hazardous) materials, the authorized inner packaging limit in the ICAO Technical Instructions is greater than the limit currently allowed in Tables 1 and 2 at § 173.27(f)(3). Therefore, PHMSA is revising paragraph (f)(3), Table 1 and Table 2 to address this inconsistency with the ICAO Technical Instructions. Specifically, PHMSA is revising—for consistency with the inner packaging limits provided in Packing Instructions 956, 958, and 964 of the ICAO Technical Instructions—inner packaging net capacity limits for the following Class 9 materials:

- UN1841, Acetaldehyde ammonia
- UN1931, Zinc dithionite *or* Zinc hydrosulphite
- UN1941, Dibromodifluoromethane
- UN1990, Benzaldehyde
- UN2071, Ammonium nitrate fertilizers
- UN2216, Fish meal, stabilized *or* Fish scrap, stabilized
- UN2315, Polychlorinated biphenyls, liquid
- UN2590, Asbestos, chrysotile
- UN2969, Castor beans *or* Castor flake *or* Castor meal *or* Castor pomace
- UN3077, Environmentally hazardous substance, solid, n.o.s.
- UN3082, Environmentally hazardous substance, liquid, n.o.s.
- UN3151, Polyhalogenated biphenyls, liquid *or* Polyhalogenated terphenyls, liquid *or* Halogenated monomethyldiphenylmethanes, liquid
- UN3152, Polyhalogenated biphenyls, solid *or* Polyhalogenated terphenyls, solid *or* Halogenated monomethyldiphenylmethanes, solid
- UN3334, Aviation regulated liquid, n.o.s.
- UN3335, Aviation regulated solid, n.o.s.
- UN3432, Polychlorinated biphenyls, solid

These materials have a history of safe transport under less restrictive inner packaging limits in accordance with the ICAO Technical Instructions. The revisions offer shippers greater flexibility in packaging options to transport these materials without a degradation of safety.

Section 173.59

Section 173.59 provides informational descriptions of terms for explosives. PHMSA is amending the description of the term “detonators” to include a reference to electronic programmable detonators. Additionally, PHMSA is adding a separate term and description for “Detonators, electronic *programmable for blasting*.” These revisions correspond to the addition of the UN0511, UN0512, and UN0513 (Detonators, electronic *programmable for blasting*) to the HMT. PHMSA intends to distinguish between “electronic detonators” and “electric detonators,” as each has different design characteristics, by adding these new entries in the HMT and the editorial amendments in § 173.59. PHMSA expects this additional precision in shipping descriptions will provide a safety benefit. *See* § 172.101 of the “V. Section-by-Section Review of Amendments” for additional discussion on electric and electronic detonators.

Section 173.115

Section 173.115 outlines classification criteria for Class 2 (gas) materials. PHMSA is updating the version of ISO 10156:2010, “*Gases and gas mixtures — Determination of fire potential and oxidizing ability for the selection of cylinder valve outlets*,” incorporated by reference in paragraph (k), which specifies how the oxidizing ability of a Division 2.2 (non-flammable) gas should be calculated. Currently the HMR incorporates by reference the 2010 edition of this ISO standard and its associated technical corrigendum in § 171.7. As part of ISO’s regular periodic review of each

standard, ISO standard 10156:2010 was reviewed and updated and a new revised ISO 10156:2017 was published in September 2017. The 2017 edition supersedes and replaces ISO 10156:2010, which had been technically revised through ISO 10156:2010/Cor 1:2010. PHMSA updates the incorporation by reference of ISO 10156, to the 2017 edition. The updated document includes technical revisions pertaining to the flammability of gases and gas mixtures in air as well as a new calculation method for determining the lower flammability limit of gas mixtures. PHMSA reviewed the calculation method and agrees that it will assist shippers in properly classifying a Division 2.2 gas, without introducing any adverse safety risks. Therefore, PHMSA incorporates by reference ISO 10156:2017 in § 173.115(k).

Section 173.134

Section 173.134 provides classification criteria and exceptions for Division 6.2 infectious substances. PHMSA revises paragraph (a) to include references to “UN3549, Medical Waste, Category A, Affecting Humans, *solid or* Medical Waste, Category A, Affecting Animals *only, solid*.” Specifically, paragraphs (a)(1), (a)(1)(i), and (a)(5) are revised by including UN3549 among the list of UN numbers to use for description of an infectious substance. These revisions are consistent with the addition of this new hazardous materials description to the HMT.

Additionally, PHMSA removes the term rickettsiae from the list of types of microorganisms in paragraph (a)(1). Rickettsiae are a specific group of bacteria, and this specific type of bacteria is redundant because bacteria are already listed as a type of potential pathogenic microorganism.

Section 173.137 prescribes the requirements for assigning a PG to Class 8 (corrosive) materials. The HMR requires offerors to classify Class 8 material and assign a PG based on tests conducted in accordance with the OECD Guidelines for the Testing of Chemicals. One of the tests currently authorized in the HMR is the 2015 OECD Guideline for the Testing of Chemicals “*Test No. 431: In vitro skin corrosion: reconstructed human epidermis (RHE) test method*” which may be used to determine that a material is not corrosive to human skin. PHMSA is incorporating by reference the 2016 version of OECD Guidelines for the Testing of Chemicals “*Test No. 431: In vitro skin corrosion: reconstructed human epidermis (RHE) test method.*” This document was updated to introduce sub-categorization for skin corrosion and adopted by the OECD in 2013 and further revised in 2014, 2015, and 2016, as Guidelines for the Testing of Chemicals “*Test No. 431: In vitro skin corrosion: reconstructed human epidermis (RHE) test method.*” According to the OECD, this updated test method permits subcategorization of corrosive chemicals into three categories: sub-category 1A and sub-category 1B/C, which correspond to PG I, PG II, and PG III, respectively. However, prior to the 2016 edition of the OECD Guidelines, the ability to clearly distinguish between PG II and PG III had previously never been formally evaluated or validated due to the lack of high-quality reference in vivo data against which to benchmark the in vitro results.

Changes to the UNMR were made because of the additional level of sub-categorization and differentiation that is possible using this updated test method. Accordingly, PHMSA is allowing corrosive materials that are tested using OECD Guidelines for the Testing of Chemicals *Test No. 431* to be assigned to PG II without further in vivo testing if the test method does not clearly distinguish between PG II or PG III. Since the packing group assignment indicates the required level of packaging

according to the degree of danger presented by hazardous materials, this would relegate corrosive material that cannot be clearly distinguished between a medium danger PG II and a low danger PG III to be subject to the more conservative packaging requirement associated with PG II material unless additional testing is conducted. PHMSA anticipates that the use of the 2016 version of the OECD Guidelines for the Testing of Chemicals *Test No. 431* will benefit shippers of potential corrosives by clarifying corrosivity determinations or exclusions and eliminating excessive testing to distinguish between PG II and PG III.

The regulatory text also references OECD Guidelines for the Testing of Chemicals *Test No. 404, 430, and 435*, which are already approved for incorporation by reference in this section, and no change was made to these standards in this final rule.

Section 173.172

Section 173.172 specifies the eligibility conditions for exception from packaging requirements for certain fuel tanks used on aircraft hydraulic power units. PHMSA makes editorial revisions to these provisions to clarify packaging limits for the fuel tanks that power hydraulic power units. The fuel tanks addressed in this section are comprised of a primary containment for the fuel in the hydraulic power unit. The primary containment must consist of a welded aluminum bladder as well as an outer vessel, which is packed in non-combustible cushioning material in a strong, tightly-closed metal outer packaging. Currently, paragraphs (a) and (b) of this section state that the “Maximum quantity of fuel per unit and package is 42 L (11 gallons).” PHMSA is replacing the word “unit” in this sentence in paragraphs (a) and (b) with the words “primary containment” for consistency with the second sentence of each paragraph which states that the “primary containment of the fuel within this vessel must consist of a welded aluminum bladder having a maximum internal volume of 46 L (12 gallons).” These

editorial revisions to clarify that the maximum quantity of fuel authorized applies to both the fuel within the vessel and completed package (primary containment) rather than the hydraulic power unit itself. This revision aligns the language for this packaging exception in the HMR with the language that was similarly amended in the 2021-2022 ICAO Technical Instructions and the 21st revised edition of the UNMR. This alignment provides clarity for packaging of certain fuel tanks and, as such, PHMSA does not expect this revision to adversely affect safety.

Section 173.181

Section 173.181 prescribes packaging requirements for liquid pyrophoric materials. Specifically, § 173.181 provides the requirements on closures for metal or glass receptacles when used as inner packagings—i.e., receptacles—in combination packagings. The UNMR contain Packing Instruction P404 which includes provisions for resealing inner receptacles with threaded closures. Currently, § 173.181 does not include provisions for resealing of inner receptacles with threaded closures. The safety concern when resealing inner receptacles that contain liquid pyrophoric materials is that small amounts of residue may adhere to the threads and present a hazard upon closing of the inner packaging and that friction generated from screwing the cap back onto the receptacle may cause the residue to react critically (e.g., self-heating or spontaneous combustion). Based on this concern, the UNMR now permit closures of inner receptacles to be either threaded or physically held in place by any means capable of preventing back-off or loosening of the closure under conditions normally incident to transportation (e.g., vibration during transport). PHMSA is also concerned about this potential hazard and authorizes an alternative method of closure to prevent this potential hazard. Therefore, PHMSA revises the requirements of § 173.181 for closures of inner packagings for liquid pyrophoric materials to specify that they may have alternative

closures that are physically held in place by any means capable of preventing back-off or loosening during transportation.

Section 173.185

Section 173.185 prescribes requirements for transportation of lithium cells and batteries. Paragraph (c) prescribes requirements for smaller cells or batteries and paragraph (c)(3) specifies hazard communication requirements including the use of the lithium battery mark. PHMSA revises the minimum size of the lithium battery mark from 120 millimeters (mm) wide by 110 mm high to 100 mm by 100 mm. This reduction in size requirements for this mark is consistent with the existing minimum size requirements for the limited quantity and excepted quantity marks in the HMR (*see* §§ 172.315 and 173.4a) and does not diminish the ability to read or recognize the marking. The reference to the shape of the mark is amended to include “square” to account for the new minimum dimensions while also maintaining the existing shape of a “rectangle” to continue authorized use of the lithium battery mark with 120 mm by 110 mm dimensions. In addition, the minimum size of the lithium battery mark for packages too small to display the revised 100 mm by 100 mm dimensions, is revised from 105 mm wide by 74 mm high to 100 mm wide by 70 mm high. Additionally, an informal working paper²⁷ submitted to the 54th Session of the UNSCOE noted that due to the large volume of lithium batteries shipped in small packages, the reduction in the size of the mark could reduce the quantity of packagings produced and consequently the quantity of empty packagings sent for disposal or recycling. This minimum size does not invalidate use of larger marks meeting the currently authorized minimum size requirements.

²⁷ Rechargeable Battery Association (PRBA) & the Advanced Rechargeable & Lithium Batteries Association (RECHARGE), Proposal on the Dimensions of the Lithium Battery Mark Submitted to the UN Subcommittee of Experts on the Transport of Dangerous Goods at the 54th Session (Dec. 3, 2018), <https://www.unece.org/fileadmin/DAM/trans/doc/2018/dgac10c3/UN-SCETDG-54-INF55.e.pdf>.

COSTHA, DGAC and MDTC provided comments in support of this revision.

COSTHA notes that while some of its members are in favor of adopting new size requirements for the lithium battery mark, other members are concerned about reducing the size of hazard communication on packages. Moving forward, COSTHA requests that PHMSA continue to consider the impact of reducing hazard communication (by size or example) and be open to alternate forms of hazard communication that may be more effective for both carriers/operators and emergency responders. PHMSA acknowledges the comments and concerns raised by some COSTHA members on the new minimum size requirements for lithium battery markings. However, PHMSA understands that the minimal reduction (no more than 5 mm in each direction) in required size for markings adopted in this final rule will not cause a reduction in safety.

Section 173.187

Section 173.187 prescribes packaging requirements and other provisions for “pyrophoric solids, metals, or alloys, n.o.s.” The 21st revised edition of the UNMR includes an amendment to Packing Instruction P404 to address concerns with threaded closures when resealing inner receptacles after partial removal of product. The amendment addresses small amounts of residue of pyrophoric materials that may adhere to the threads and present a hazard upon closing of an inner receptacle. As with liquid pyrophoric materials discussed above, there is concern that friction generated from screwing the cap back onto the inner receptacle may cause the residue to react critically (e.g., self-heating or spontaneous combustion). Based on this concern, the UNMR now allow closures of inner receptacles to be either threaded *or* physically held in place by a means capable of preventing back-off or loosening of the closure under conditions normally incident to transportation (i.e., impact or vibration during transport).

After reviewing this issue, PHMSA is also concerned about this potential hazard and amends § 173.187 to authorize an alternate method of closure to prevent this potential hazard. Specifically, PHMSA is revising the requirements for closures of inner receptacles for solid pyrophoric materials to specify that they may have threaded closures or other alternative closures that are physically held in place by a means capable of preventing back-off or loosening.

Section 173.199

Section 173.199 prescribes the packaging requirements for Division 6.2 Category B infectious substances. Consistent with the ICAO Technical Instructions, PHMSA is revising paragraph (a)(5) to require that for air transport the entire “UN3373” mark must appear on one side of the package. PHMSA expects that placing marks on a single side of a package will provide increased visibility of hazard communication on the smaller package types that are frequently used in air transport. These measures also reduce ambiguity for air operator employees conducting acceptance checks as to whether the package appropriately indicates the hazards without having to make a subjective determination. Regarding the Category B infectious substance mark, the revision helps ensure that any packages containing infectious substances, including COVID-19 materials, have appropriate visibility and thus, ensure the safe transport of such materials. For details on the rationale for this requirement, *see* the discussion of § 172.406 in the “V. Section-by-Section Review of Amendments.”

Section 173.218

Section 173.218 contains packaging and product stabilization requirements for transporting stabilized fish meal or fish scrap (UN2216) as a Class 9 material. Currently, the provisions of this section are limited to shipments by vessel; however, PHMSA

amends this provision to authorize the transport of this material by air. This revision responds to changes in the fish meal or fish scrap market which has experienced an increased demand for more timely shipments of samples of this item for evaluation by potential purchasers. Adding provisions to permit shipment by air, rather than limiting to shipment by vessel, relieves frustration in the market for fish meal or fish scrap by allowing shipments of small amounts of this material to be expedited by air. This revision is consistent with amendments adopted in the 2021-2022 version of the ICAO Technical Instructions, which have been revised to allow the transport by air of non-bulk packages of fish meal or fish scrap, subject to quantity limitations and stabilization requirements.

Under this revision, UN2216 material is permitted on passenger aircraft and cargo aircraft in amounts up to 100 kg and 200 kg, respectively, and in UN performance packaging that aligns with the ICAO Technical Instructions. Additionally, to ensure the safe transport of this material by air, PHMSA is adding stabilization requirements similar to those that are in place for shipments by vessel. Stabilization of fish meal and fish scrap by applying antioxidants is required in order to offer the material under a Class 9 stabilized proper shipping name. The stabilization of fish meal and fish scrap is needed in order to mitigate a fire hazard while in transportation. Fish meal or fish scrap transported by air must have been stabilized at production, and within the twelve months prior to transportation. Given the safeguard provided by stabilization of this material prior to transportation, as well as the packaging and quantity restrictions, PHMSA expects that there will be no degradation of transportation safety in authorizing air transportation.

In addition to adding these stabilization requirements for air transportation, PHMSA amends the stabilization requirements that are currently in place for vessel shipments. The HMR currently requires shipments of fish meal or fish scrap by vessel to

contain at least 50 parts per million (ppm) (mg/kg) of ethoxyquin, 100 ppm (mg/kg) of butylated hydroxytoluene (BHT), or 250 ppm (mg/kg) of tocopherol-based antioxidant at the time of shipment for bulk shipments when transported in freight containers. PHMSA extends these stabilization requirements to all vessel shipments, as required by the IMDG Code. While the change in language makes the stabilization requirement more widely applicable, PHMSA expects that the impact on the regulated community will be minimal as fishmeal and fish scrap shipments offered for transport (in non-bulk and bulk) are already typically treated with quantities of stabilizer (antioxidants) well above the minimum amounts currently shown in section § 173.218 as common industry practice.

Section 173.221

Section 173.221 prescribes transportation requirements and exceptions for “UN2211, Polymeric beads expandable” and “UN3314, Plastic molding compound,” which are both Class 9 (miscellaneous) materials. Historically, transportation of these materials has been limited to single packagings under both the HMR and in Packing Instruction 957 of the ICAO Technical Instructions. However, these limitations are inconsistent with the UNMR and the general provisions of the ICAO Technical Instructions, which permit combination packagings when single packagings are authorized. These packagings are constructed with inner packagings made of glass, plastic, metal, paper, or fiber and with outer packagings utilizing drums, boxes, and jerricans made of various materials. This conflict in permitted packagings has been corrected in the most recent edition of the ICAO Technical Instructions.

PHMSA finds that allowing combination packaging for these Class 9, low hazard materials is consistent with general packaging authorizations throughout the HMR. In general, combination packaging is allowed for materials that are more hazardous as long as the minimum packaging performance requirements are achieved. Single packaging

and combination packaging are subject to the same performance standards, meaning an equivalent level of safety is achieved. Therefore, PHMSA is making conforming revisions to § 173.221 to allow the use of combination packagings (i.e., packagings that use a combination of inner and outer packagings for containment) for these materials. This revision provides packaging selection flexibility as well as consistency with UNMR and revised ICAO Technical Instructions without any impact on safe transport of these materials. DGAC provided a comment in support of this revision.

Section 173.222

Section 173.222 specifies the non-bulk packaging requirements for “UN3363, Dangerous goods in machinery or apparatus.” As discussed in revisions to § 172.101, PHMSA is modifying the proper shipping name associated with UN3363 to include “dangerous goods in articles,” in addition to “dangerous goods in machinery or apparatus.” In the HM-215O final rule, PHMSA added new entries for articles containing hazardous materials that are not otherwise specified by name in the HMT (e.g., “UN3547, Articles containing corrosive substance, n.o.s.”). These new entries addressed transportation scenarios where various hazardous materials or residues are present in articles above the quantities currently authorized for machinery or apparatus transported as “UN3363, Dangerous goods in machinery *or* Dangerous goods in apparatus.” In addition to adding these new entries to the HMT, PHMSA added packaging provisions in § 173.232, as well as a definition for articles. The definition states that “article means machinery, apparatus, or other devices containing one or more hazardous materials (or residues thereof) that are an integral element of the article, necessary for its functioning, and that cannot be removed for the purpose of transport.” This addition created regulatory discrepancies between articles that cannot be defined as machinery or apparatus but also do not qualify as “Articles containing hazardous

materials, n.o.s.” even as there is no safety basis to exclude such articles from the scope of § 173.222 provisions. Therefore, PHMSA revises the provisions in § 173.222 to reflect the addition of dangerous goods in articles to the current HMT entry for “UN3363, Dangerous Goods in Machinery *or* Dangerous Goods in Apparatus” as discussed in connection with the revisions to § 172.101 above. These revisions are intended to provide flexibility in the choice of the most appropriate modifier to be selected as a proper shipping name (e.g., article, machinery, or apparatus). This flexibility in selecting the most appropriate description of the hazardous material helps ensure appropriate packaging selection and hazard communication, thus enhancing safety.

Section 173.225

Section 173.225 prescribes packaging requirements and other provisions for organic peroxides. As a result of new peroxide formulations becoming commercially available, the 21st revised edition of the UNMR includes updates to the list of identified organic peroxides and new packing instructions for these materials. To maintain consistency with the UNMR, PHMSA is updating the Organic Peroxide Table in § 173.225(c) to revise the entry “Di-(4-tert-butylcyclohexyl) peroxydicarbonate [as a paste],” by (1) changing the classification of the material as “UN3116, Organic peroxide type D, solid, temperature controlled” to “UN3118, Organic peroxide type E, solid, temperature controlled”; and (2) changing the packing method from OP7 to OP8.

An organic peroxide Type D is an organic peroxide that: (1) detonates only partially, but does not deflagrate rapidly and is not affected by heat when confined; (2) does not detonate, deflagrates slowly, and shows no violent effect if heated when confined; or (3) does not detonate or deflagrate, and shows a medium effect when heated under confinement. An organic peroxide Type E is an organic peroxide which neither detonates nor deflagrates and shows low or no effect when heated under confinement.

Di-(4-tert-butylcyclohexyl) peroxydicarbonate was identified as a Type E organic peroxide based on evaluation of new test data within the classification scheme for self-reactives and organic peroxide in Figure 20.1 of the UNMR. Finally, PHMSA revises the packing method from OP7 to OP8 consistent with the revised classification of Di-(4-tert-butylcyclohexyl) peroxydicarbonate to a lesser hazard Type E organic peroxide. The packaging method indicates the largest size authorized for packaging of a particular organic peroxide. Specifically, for Di-(4-tert-butylcyclohexyl) peroxydicarbonate, assignment of OP8 allows up to 400 kg for solids and combination packagings, and up to 225 L for liquids.

PHMSA revises the Organic Peroxide IBC Table in paragraph (e) to maintain alignment with the 21st revised edition of UNMR by adding new entries for “tert-Amyl peroxy-pivalate, not more than 42% as a stable dispersion in water” and “tert-Butyl peroxy-pivalate, not more than 42% in a diluent type A” and identifying it as “UN3119, Organic peroxide type F, liquid, temperature controlled.” PHMSA determines that adding provisions for the transport of these newly available peroxide formulations will allow better oversight for safe and consistent shipment of these hazardous materials.

Section 173.301b

Section 173.301b outlines additional general requirements when shipping gases in UN pressure receptacles (e.g., cylinders). Paragraph (a)(2) of this section requires that the gases or gas mixtures be compatible with the UN pressure receptacle and valve materials prescribed for metallic materials in ISO 11114-1:2012(E), *Gas cylinders—Compatibility of cylinder and valve materials with gas contents—Part 1: Metallic materials*. This document provides compatibility requirements for the selection of combinations of metallic cylinder and valve materials for use with gas or gas mixtures. In the interest of providing uniformity with regard to reference standards used

domestically and internationally, PHMSA is revising the compatibility requirements to include a reference to the 2017 amendment (ISO 11114-1:2012/Amd 2017(E)), which ISO published as a supplement to ISO 11114-1:2012(E). This amendment provides enhanced instructions on the permissible concentrations of certain gases to ensure safe transport of a wider variety of gases in newly developed types of metallic cylinders and valves.

Second, PHMSA revises paragraph (c)(1), which specifies valve requirements for pressure receptacles. Currently in the HMR, paragraph (c)(1) requires valves for pressure receptacles (excluding quick release cylinder valves, which must conform to the requirements in ISO 17871:2015(E)) to conform to various editions of ISO 10297, “*Gas cylinders — Cylinder valves — Specification and type testing*”, including the 1999, 2006, and 2014 editions. ISO 10297:2014 specifies design, type testing, and marking requirements for certain cylinder valves intended to be fitted to refillable transportable gas cylinders which convey compressed, liquefied, or dissolved gases. PHMSA is modifying the valve requirements in this paragraph such that when the use of a valve is prescribed, the valve must conform to the requirements of ISO 10297:2014 as well as the supplemental amendment, ISO 10297:2014/Amd 1:2017. ISO 10297:2014/Amd 1:2017(E) corrects errors in ISO 10297:2014 and also includes modifications for valves for tubes and pressure drums. For consistency with the UNMR, PHMSA also adds a sunset date of December 31, 2022, for the authorization of the use of ISO 10297:2014 when not used in conjunction with the supplemental 2017 amendment. PHMSA has reviewed this supplemental amendment as part of its regular participation in the review of amendments for the UNMR and does not expect any degradation of safety standards in association with the use of these two documents.

Lastly, paragraph (c)(2) of this section outlines certain requirements for valves on UN pressure receptacles. Specifically, by following one of the listed methods or

standards in this paragraph, valves are required to be protected from damage that could cause inadvertent release of their contents. PHMSA is introducing an additional option by allowing the use of valves designed and constructed in accordance with Annex A of ISO 17879:2017 for UN pressure receptacles with self-closing valves with inherent protection (except those in acetylene service). Annex A of ISO 17879:2017 is a new standard which establishes design, type testing, marking, and manufacturing tests and examination requirements for self-closing valves fitted to refillable transportable gas cylinders conveying compressed, liquefied, or dissolved gases (other than acetylene). PHMSA has determined that incorporating ISO 17879 fulfills the need for a standard that governs self-closing valves on cylinders, which are typically used in the calibration, beverage, and medical gas industries and mirrors requirements for impact testing and burst testing specified in ISO 10297. PHMSA has experience with permitting the use of valves constructed to ISO 17879 through special permit,²⁸ which has occurred without incident since 2019. Incorporating this ISO standard eliminates the need and associated burden for manufacturers to request a special permit to use the valves as they become more widely transported as a result of their authorization by other competent authorities.

The regulatory text references the following standards that are already approved for incorporation by reference in this section and no revisions are being made to these standards: ISO 11114-1:2012(E); ISO 11114-2:2013; ISO 10297:2014; ISO 17871:2015; ISO 11117:2008 and Technical Corrigendum 1; ISO 11117:1998; ISO 16111:2008.

Section 173.304b

Section 173.304b contains additional requirements for shipment of liquefied compressed gases in UN pressure receptacles. In this section, paragraph (b) describes the

²⁸ See, e.g., Special Permit 20876 (Apr. 21, 2021), https://cms7.phmsa.dot.gov/approvals-and-permits/hazmat/file-serve/authorization/2019045387_SP20876.pdf/2019045387/SP20876.

filling limits for UN pressure receptacles expressed in terms of “filling ratio,” or the ratio of the mass of gas in the cylinder compared to the water capacity of the cylinder.

Paragraph (b)(2) of this section provides the maximum allowable filling limits for low pressure liquefied gases. As currently provided in paragraph (b) of 173.304b, the term “filling factor” is currently used to describe the filling limit in terms of the maximum mass of contents in kg of the gas per liter of water capacity, which is intended to have the same meaning as the “filling ratio.” To increase clarity of the HMR, PHMSA revises paragraph (b)(2) by deleting the term “filling factor” and only using the performance standard of “maximum mass in kilograms of contents per liter of water capacity” so that this is not misunderstood as being different from the defined term “filling ratio.” This revision is consistent with the same editorial correction made in the 21st revised edition of the UNMR. The term “filling factor” is used in the context of the UNMR and could be misunderstood as being different from the defined term “filling ratio.” Clarifying the language pertaining to the filling ratio will provide a safety benefit by eliminating confusion about the definition of the term “filling factor” or “filling ratio.”

Section 173.306

Section 173.306 provides exceptions from HMR requirements for transportation of limited quantities of compressed gases. Paragraph (f) of this section provides exceptions for the transportation of accumulators, which are transported under “UN3164, Articles, pressurized pneumatic *or* hydraulic.” Accumulators are devices in which a fluid is kept under pressure as a means of storing energy. PHMSA revises paragraphs (f)(2) and (f)(3) to allow robust accumulators to be transported unpackaged, in crates, or in overpacks that provide equivalent protection to the hazardous material being transported. The term robust is used to describe articles that are strong enough to withstand the shocks and loadings normally encountered during transport, including trans-shipment between

cargo transport units and between cargo transport units and warehouses, as well as any removal from a pallet for subsequent manual or mechanical handling. PHMSA expects that the amendments will increase flexibility for shippers and harmonize with revisions to the UNMR which limits the packaging required for “UN3164, Articles, pressurized pneumatic *or* hydraulic” when afforded equivalent protection by the article being transported.

Additionally, PHMSA adds a new paragraph (n) to include provisions for the transport of “UN2037, Receptacles, small, containing gas *or* gas cartridges” for recycling or disposal. These provisions include packaging requirements, conditions for exception, and maximum gross weight limits, applicable to small receptacles or cartridges containing gas not exceeding 1.0 L (0.3 gallons) capacity. Codifying these provisions will create a regulatory framework for transporting these materials for recycling or disposal and reduce the administrative burden that otherwise applies to fully regulated gas receptacles. Further, reducing this administrative burden may lead to other environmental benefits by facilitating shipments destined for recycling or disposal.

Section 173.335

Section 173.335 specifies packaging requirements for hazardous materials transported as chemicals under pressure (e.g., “UN3500, Chemical under pressure, n.o.s.”). Chemicals under pressure are regulated as gases but differ in that they are liquids, pastes, or powders, and pressurized with a propellant that meets the definition of a gas in § 173.115. Materials transported under “UN3500” may include those that are widely used in fire suppression systems and other items used for fire control.

PHMSA is providing an extended periodic inspection period for cylinders containing fire extinguishing agents transported under UN3500. This amendment is consistent with a new special packing provision—PP97—added in the 21st revised edition

of the UNMR to provide a test period of 10 years for tubes (cylinders) that have a capacity of 450 L or less and that are filled with fire extinguishing agents. The intent of this revision was to resolve the discrepancy in inspection periods between (1) gas-filled cylinders intended for installation in fire suppression systems and (2) cylinders used for the same purpose, but which contain a fire extinguishing agent (e.g., a liquid) in combination with a gas used as a propellant. Gases transported under “UN1956, compressed gas n.o.s.” have a maximum test period for periodic inspection of 10 years, whereas the maximum test period for “UN3500, chemical under pressure, n.o.s.” is only five years. However, the updated UNMR extended the inspection period for cylinders containing fire extinguishing agents transported under UN3500 because they are typically (1) inert chemicals with no subsidiary risks and (2) they are typically filled at lower pressures than cylinders containing UN1956 materials. Additionally, these fire extinguishing materials and devices are maintained and stored in a manner that minimizes the degradation of the cylinder (e.g., in protected indoor environments).

A recent PHMSA rulemaking, HM-234,²⁹ broadened the scope of cylinders eligible to be classified as “UN1044, fire extinguishers” and the intent was to permit cylinders charged with fire extinguishing agents intended for use in fire suppression systems to be described and transported under “UN1044, fire extinguishers.” However, cylinders charged solely with a compressed gas or liquefied gas and used in a fire suppression system solely to expel a separately stored extinguishing agent are not eligible for transportation under UN1044. Furthermore, with respect to the UNMR, cylinders charged with a fire extinguishing agent and intended for use in a fire suppression system are specifically excluded from transportation as “UN1044, fire extinguisher.” Therefore, while HM-234 added provisions that may allow hazardous materials in cylinders that have historically been described and transported as UN1956 or UN3500 to be transported

²⁹ 85 FR 85380 (Dec. 28, 2020).

as “UN1044, fire extinguisher”, amending § 173.335 is still necessary to maintain alignment with the UNMR because the UNMR still do not allow cylinders intended for use in fire suppression systems to be transported under UN1044.

Because of this conflict in classification for similar items, PHMSA extends the periodic inspection period for cylinders containing gases or liquid/gas mixtures that are used as fire extinguishing agents under UN3500, to facilitate international shipment of these items by aligning the § 173.335 periodic inspection requirements with the periodic inspection period adopted in the UNMR. Recognizing that these items UN3500 and UN1044 are functionally the same but classified differently outside of the United States, PHMSA expects that establishing parallel inspections periods for similar items will facilitate international movement and continued use of these cylinders domestically and internationally. DGAC provided comments in support of this revision. Additionally, DGAC requests that PHMSA consider expanding the retest period for cylinders that are used for other hazard classes, such as flammable liquids, that are not transported under pressures meeting the definition of a compressed gas. PHMSA appreciates DGAC’s comment; however, expanding the retest period for cylinders containing other hazardous classes is beyond the scope of this rulemaking and would benefit from stakeholder input in a future rulemaking. PHMSA encourages DGAC to consider submitting a petition for rulemaking in accordance with § 106.100 providing data and justification for why PHMSA should expand the cylinder retest period when used in service for hazardous materials other than gas.

D. Part 175

Section 175.8

Part 175 prescribes requirements that apply to the transportation of hazardous materials in commerce aboard aircraft, including items carried by air passengers and

crew, as well as items carried by the aircraft operator in accordance with airworthiness requirements and operating regulations, or in support of in-flight service. Section 175.8 provides exceptions from the HMR for certain equipment and materials used by aircraft operators that are regulated as hazardous materials. PHMSA amends paragraph (b) to provide a new exception for alcohol-based hand sanitizers and alcohol-based cleaning products carried aboard an aircraft by the operator for the purposes of passenger and crew hygiene. These changes align the HMR with amendments made to the ICAO Technical Instructions—as amended in Addendum 1—published on December 31, 2020, in response to the COVID-19 public health emergency. The intent of this amendment is to ensure that air operators are able to equip aircraft with alcohol-based sanitizers for use in the cabin for the purposes of passenger and crew hygiene without the regulatory burden of documentation and packaging otherwise associated with the transport of Class 3 (flammable liquid) hazardous materials. Finally, in this final rule, we are adjusting the regulatory text slightly from what was proposed in the NPRM to clarify that the alcohol-based hand sanitizers and alcohol-based cleaning products should be physically in the cabin of the aircraft. We expect that this minor modification captures the true intent of this exception more accurately. This amendment is beneficial to public interest given that it assists in limiting the spread and contraction of viruses such as COVID-19 without an anticipated decrease in transportation safety.

Section 175.9

Section 175.9 provides exceptions for certain special aircraft operations. Paragraph (b)(5) excepts organ preservation units necessary to protect human organs when carried in the aircraft cabin, provided certain conditions are met. As written, the current provisions only allow for devices powered by non-spillable batteries. However, the technology for powering such devices has evolved to include lithium batteries. To

maintain consistency with the ICAO Technical Instructions, PHMSA adds provisions for organ preservation units powered by lithium batteries (both metal and ion). Specifically, lithium metal or lithium ion cells or batteries must meet the general provisions prescribed in § 173.185(a) and spare lithium batteries need to be individually protected to prevent short circuits when not in use to ensure safe transport. PHMSA expects this amendment will promote broader use of the exception for organ preservation units. Finally, it facilitates international movement of these devices by harmonizing with ICAO Technical Instructions which allow lithium batteries as power sources for the devices while still ensuring safe transport.

Section 175.10

Section 175.10 specifies the conditions under which passengers, crew members, or an operator may carry hazardous materials aboard a passenger aircraft. PHMSA amends paragraph (a)(1)(ii) of this section to permit Division 2.2 aerosols with no subsidiary hazard, in addition to those that are not for medicinal or personal toiletry use, as carry-on items (*see* § 175.10(a)(1)(i) for provisions pertaining to non-radioactive medicinal and toilet articles). Currently, these materials (i.e., Division 2.2 non-flammable gases) are only authorized in checked baggage. Additionally, PHMSA is adding a conditional requirement to new paragraph (a)(1)(iv) that the material in the Division 2.2 aerosols must not cause extreme annoyance or discomfort, in the event of an unintentional release, to crew members so as to inhibit performance of their assigned duties. The revisions align the HMR with amendments made to the ICAO Technical Instructions. In addition, these revisions are consistent with special permit DOT-SP 21021,³⁰ which was issued in response to the COVID-19 public health emergency to

³⁰ DOT Special Permit 21021 (May 29, 2020), <https://www.phmsa.dot.gov/approvals-and-permits/hazmat/file-serve/offer/SP21021.pdf/2020034999/SP21021>.

ensure flight crews could carry-on sanitizing aerosol products that may not have been considered as items for personal use. PHMSA has determined that this revision is beneficial and in the public interest because it expands the use of the passenger and crewmember exceptions applicable to Division 2.2 aerosols by allowing such aerosols in carry-on baggage. This is particularly beneficial for sanitizers to aid in preventing the potential spread and contraction of viruses such as COVID-19 without an anticipated decrease in transportation safety.³¹

Section 175.10(a)(11) outlines the provisions for self-inflating personal safety devices and currently allows for the carriage of only one device with the approval of the aircraft operator. PHMSA is increasing the allowance from a single self-inflating personal safety device to two devices in response to an increase in passengers seeking to travel with their own devices. PHMSA clarifies that each self-inflating safety device may be fitted with no more than two small gas cartridges and that an additional two spare cartridges per device may be carried with the devices. In addition, PHMSA adds the text “intended to be worn by a person” to specify that this provision is only intended for self-inflating personal safety devices that are designed to be worn by a person and does not apply to other types of safety devices. PHMSA expects this revision will promote use of the self-inflating personal safety devices. Specifically, it provides passengers more flexibility when carrying self-inflating devices such as lifejackets, motorcycle jackets, and horse-riding vests. Further, PHMSA does not expect transportation safety will be compromised as these devices are designed with multiple initiation processes required for inflation to occur, thereby inhibiting unintentional activation. PHMSA has not identified any incidents involving unintentional activation of self-inflating personal safety devices in flight.

³¹ PHMSA notes that, apart from the revisions to § 175.10 of the HMR proposed here, transportation of aerosols in carry-on baggage and for any other purpose may be subject to limitations imposed by other regulators, including (but not limited to) the Transportation Security Administration.

Section 175.75

Section 175.75 provides quantity limitations and stowage location requirements for air transportation. During internal review of the stowage requirements found in § 175.75, PHMSA and FAA concluded that making several editorial revisions increases the clarity of this section, and therefore would enhance the safety of hazardous materials transported by aircraft. These revisions do not substantively change current requirements of this section and they are intended only for purposes of increasing the understanding of air stowage requirements. The editorial revisions to this section are discussed as follows:

- The current structure for paragraph (b) outlines three distinct stowage requirements in a single paragraph. To increase readability, PHMSA revises paragraph (b) by separating the three requirements into three subparagraphs each addressing a single stowage requirement. In response to the NPRM, PHMSA received a comment from Airbus suggesting that PHMSA also include reference to a Class F compartment in § 175.75(b). However, this comment is beyond the scope of this rulemaking since PHMSA did not propose to include requirements associated with Class F cargo compartments in the NPRM, and therefore, is not included in this final rule. Additionally, PHMSA encourages Airbus to submit a petition for rulemaking in accordance with § 106.100 providing data and arguments for why Class F cargo compartments should be included in § 175.75(b).
- Insertion of an additional distinct sentence in the aforementioned revised format of paragraph (b) to highlight the existing requirement in § 175.75 that all packages displaying a “Cargo Aircraft Only” label in accordance with § 172.402(c) must be loaded in an accessible manner (i.e., a manner accessible to the cargo aircraft’s crew or other authorized person). This longstanding

requirement of the HMR is buried in the Quantity and Loading Table of paragraph (f). In the past, air carrier stakeholders have suggested to PHMSA and FAA that the stowage requirements would be clearer if this important requirement were explicitly stated in § 175.75. Therefore, PHMSA is specifying this requirement in the stowage requirements as new subparagraph (b)(4).

- Correction of an inadvertent error in the Quantity and Loading Table of paragraph (f), Note 1, that removed Division 6.2 material from eligibility for exception from the inaccessible loading restriction for Cargo Aircraft Only packages. This inadvertent error occurred in a corrections and response to administrative appeals final rule.³² PHMSA revised requirements for Division 6.1 material among the list of eligible materials but in doing so inadvertently removed reference to Division 6.2 material. This change was not intended and therefore, PHMSA is reinserting reference to Division 6.2 material in Note 1.
- Insertion of an Oxford comma in the Quantity and Loading Table of paragraph (f), Note 1, item d. to more clearly indicate that Class 9 material, limited quantity material, and excepted quantity material all qualify for this provision. PHMSA and FAA are aware that some air carrier stakeholders have expressed confusion with the language in Note 1, item d., and acknowledge that the omission of a comma between “Limited Quantity” and “Excepted Quantity” may create the impression that only Class 9 limited or excepted quantity material are eligible for this exception. Note 1, item d. has always included all eligible hazard classes of limited quantity and excepted quantity material.

E. Part 176

³² 78 FR 65453 (Oct. 31, 2013). This rule affected rules HM-215K, HM-215L, HM-218G, and HM-219.

Section 176.84

Part 176 contains requirements associated with transportation of hazardous materials by vessel. Section 176.84 prescribes the meanings of numbered or alphanumeric vessel transport stowage provisions that are assigned to hazardous materials, and which are listed in column (10B) of the HMT. The provisions in § 176.84 are separated into general stowage provisions, which are defined in the “table of provisions” in paragraph (b), and the stowage notes unique to vessel shipments of Class 1 explosives, which are defined in the table in paragraph (c)(2). PHMSA has determined that the following revisions will improve safety by ensuring that hazardous materials are properly stowed on vessels.

First, PHMSA is revising stowage provision 4 in paragraph (b). Existing stowage provision 4 directs shippers to “Stow ‘Separated from’ liquid organic materials.” PHMSA modifies the language in this code for clarity and to facilitate proper stowage. In a proposal submitted to the IMO, it was noted that many liquid organic materials are not dangerous goods and that it is difficult to identify these commodities for purposes of segregation.³³ Furthermore, the distinction between organic and inorganic substances cannot be easily discovered by persons responsible for packing a cargo transport unit. PHMSA has determined that requiring a determination as to whether a cargo is an organic or inorganic substance should be amended with a more readily understood requirement to characterize these items as combustible materials. This clarification aids in ensuring safe segregation of materials assigned this stowage provision. Therefore, PHMSA is amending stowage provision 4 to require materials assigned this code to “not be stowed” with combustible materials in the same cargo transport unit.

Second, PHMSA adds new stowage provisions under codes 155, 156, and 157:

³³ International Maritime Organization Sub-Committee on the Carriage of Cargoes and Containers CCC 5/6/3.

- New stowage code 155 is assigned to “UN2814, Infectious substances, affecting humans” and “UN2900, Infectious substances, affecting animals only.” This new stowage provision advises vessel carriers to avoid handling of an infectious package or keep handling of the package to a minimum and to inform the appropriate public health authority or veterinary authority where persons or animals may have been exposed to the package contents. This provision may improve safety for packages that may be used to transport COVID-19 related material. Stowage code 155 applies particularly to any cargo offered in the traditional manner (i.e., break-bulk). The stowage code advises cargo handling personnel to limit interaction with packages of Division 6.2 materials to a minimum. The requirement to notify the appropriate public health authority or veterinary authority where persons or animals may have been exposed to package contents is intended to ensure appropriate medical attention can be provided in the event of an exposure and to control any potential further contamination as a result of contact with the material. This new stowage code serves to ensure vessel carriers are aware of the potential hazard of these packages and to ensure they follow all protocols related to handling such packages.
- New stowage code 156 is assigned to “UN3090, Lithium metal batteries,” “UN3091, Lithium metal batteries contained in equipment, *or* Lithium metal batteries packed with equipment,” “UN3480, Lithium ion batteries,” and “UN3481, Lithium ion batteries contained in equipment *or* Lithium ion batteries packed with equipment.” This new stowage provision requires damaged or defective lithium batteries that are offered for transportation in accordance with § 173.185(f) or being transported for purposes of disposal or recycling in accordance with § 172.203(i)(4), to be stowed in accordance with stowage category C. Stowage category C requires on deck stowage instead of the

currently authorized on deck or under deck stowage of these types of lithium batteries. This revision harmonizes HMR stowage requirements for lithium batteries that are damaged/defective and those that are being offered for disposal or recycling with the IMDG Code stowage requirements. This stowage change to require on deck stowage allows for more easily identifiable and effective response actions in the event of a fire involving lithium batteries onboard a vessel.

PHMSA expects that these revised shipping requirements will contribute to the safe transportation of increased volumes of lithium batteries anticipated as a result of the increased use of those technologies in the transportation and other economic sectors. In response to the NPRM, PHMSA received a comment from MDTC in support of this revision.

- New stowage code 157 is assigned to the five HMR UN1950 aerosol entries and the three UN2037 receptacles; small, containing gas or gas cartridges entries.

This new stowage provision requires aerosols and receptacles for gas transported for recycling or disposal to be stowed in accordance with vessel stowage category C and clear of living quarters. The HMR does not currently contain separate stowage provisions for aerosols or receptacles small containing gas that are being offered for disposal or recycling. These five UN1950 aerosol entries and the three UN2037 receptacle entries are currently assigned stowage category A. The change from stowage category A to category C means these materials being offered for recycling or disposal are required to be stowed “on deck only” instead of the currently authorized “on deck or under deck.” This revision in stowage requirements for aerosols and receptacles small containing gas provides more restrictive stowage requirements for these articles that have been utilized and are being offered for transportation under generally more relaxed packaging standards than if they were being offered as new articles. This more restrictive stowage

requirement more easily facilitates a response effort should one be required aboard a vessel.

Third, in the paragraph (c)(2) table, PHMSA amends stowage provisions for notes 19E and 22E. When assigned to an HMT entry, these existing notes require separation “away from” explosives containing chlorates or perchlorates and “away from” ammonium compounds and explosives containing ammonium compounds or salts. PHMSA is amending these stowage provisions to specify a more demanding “separated from” stowage requirement. The terms “away from” and “separated from” have various meanings based on the type of shipment (e.g., break-bulk, shipments within a container, or container to container). Generally speaking, the term “separated from” requires more stringent segregation. As an example, for segregation from one container to another if “away from” applies, the containers cannot be stowed one on top of the other. If “separated from” is assigned, the containers cannot be stowed in the same vertical line. For more information on the applicability of these terms please, *see* § 176.83 of the HMR. This revision also harmonizes the HMR with the IMDG Code and aligns with HMR stowage requirements for shipments of ammonium nitrates, chlorates, and perchlorates. These revisions provide additional segregation between loads of incompatible materials and decrease the likelihood of a reaction if a release were to occur onboard a vessel.

F. Part 178

Section 178.3

Part 178 contains specifications for packagings. Section 178.3 prescribes marking requirements for specification packagings. PHMSA amends paragraph (a)(4) to clarify the marking size requirement for packagings transporting solids with a 30 kg (66 pounds) maximum net mass. Additionally, PHMSA is amending the exception for reducing the

size of the required package marking applicable to packagings with a capacity of 5 L or less, or of 5 kg maximum net mass. The existing HMR text only refers to capacity, and the use of “maximum net mass” is a more appropriate standard for packagings intended for solids. This editorial revision is intended to reduce confusion over the application of the reduced size marking requirements as they apply to packagings used for solid materials. The quantity limit should be based on the net amount of solid material and not the capacity of the packaging the material is placed in. This clarification is consistent with similar provisions for solids (net mass) and liquids (capacity) throughout the HMR. Ensuring the appropriate application of the reduced size marking allowance provides consistency across persons using the reduced sized marking and therefore, improves safety of transport.

Section 178.71

Section 178.71 prescribes specifications for UN pressure receptacles. To maintain consistency with the UNMR, PHMSA is updating four ISO documents incorporated by reference in this section.

First, PHMSA amends paragraph (d)(2), which outlines the configuration and design requirements for a cylinder’s service equipment and includes items that prevent the release of the pressure receptacle contents during handling and transportation. Currently, this paragraph requires that valves for service equipment must conform to the 1999, 2006, and 2014 editions of ISO 10297. ISO 10297 specifies design, type testing, and marking requirements for cylinder valves fitted to refillable transportable gas cylinders, main valves for cylinder bundles, and cylinder valves or main valves with an integrated pressure regulator (VIPR), which convey compressed, liquefied, or dissolved gases. PHMSA is modifying the valve conformance requirements in this paragraph such that when the use of a valve is prescribed, the valve must conform to the requirements of

ISO 10297:2014 and the supplemental amendment, ISO 10297:2014/Amd 1:2017. ISO 10297:2014/Amd 1:2017 corrects errors in ISO 10297:2014, and also includes modifications for valves used on tubes and pressure drums. PHMSA has reviewed this supplemental amendment as part of its regular participation in the review of amendments for the UNMR and does not expect any degradation of safety standards in association with the use of these two documents. Additionally, PHMSA is adding an end date of December 31, 2022, to the authorization to use ISO 10297:2014 when not used in conjunction with the supplemental 2017 amendment, ISO 10297:2014/Amd 1:2017.

Second, in this paragraph, PHMSA is amending references to ISO 14246, “*Gas cylinders — Cylinder valves — Manufacturing tests and examinations.*” Currently, paragraph (d)(2) states that valves must be initially inspected and tested in accordance with ISO 14246:2014(E), “*Gas cylinders—Cylinder valves—Manufacturing tests and examinations.*” However, in 2017, ISO published ISO 14246:2014/Amd 1:2017, “*Gas cylinders — Cylinder valves — Manufacturing tests and examinations,*” which provides supplemental amendments pertaining to specific pressures to be used in the pressure test and leakproofness test of acetylene valves. PHMSA mandates the use of this amended document in § 178.71 to require acetylene valve users to use the updated values in ISO 14246:2014/Amd 1:2017. PHMSA has reviewed these documents as part of its regular participation in the review of amendments for the UNMR and does not expect any degradation of safety standards in association with the use of these two documents. PHMSA is also adding analogous compliance requirements for self-closing valves to paragraph (d)(2). ISO 17879:2017 - *Gas cylinders — Self-closing cylinder valves — Specification and type testing*, specifies the design, type testing, marking, and manufacturing tests and examinations requirements for self-closing cylinder valves intended to be fitted to refillable transportable gas cylinders which convey compressed, liquefied, or dissolved gases.

Third, PHMSA amends paragraph (l)(1), which specifies the design and construction requirements for UN composite cylinders and tubes. This revision adds a new subparagraph (iv) to reference ISO 11119-4:2016, “*Gas cylinders — Refillable composite gas cylinders — Design, construction and testing — Part 4: Fully wrapped fibre reinforced composite gas cylinders up to 150 L with load-sharing welded metallic liners.*” This document, which was adopted in the UNMR, specifies requirements for composite gas cylinders with load-sharing welded liners between 0.5 L and 150 L water capacity and a maximum test pressure of 450 bar for the storage and transportation of compressed or liquefied gases. PHMSA incorporates by reference the first three parts of the ISO 11119 series, which cover various designs of composite cylinders with a seamless liner. This fourth part defines the requirements for design, construction, and testing of composite cylinders with a welded metallic liner. Incorporating this ISO standard eliminates the need and associated burden for manufacturers to request a special permit to construct fully wrapped fiber reinforced composite gas cylinders with load-sharing welded steel liners.³⁴

Finally, PHMSA amends paragraph (o)(1) of this section to update the reference to ISO 11114-1:2012(E), “*Gas cylinders—Compatibility of cylinder and valve materials with gas contents—Part 1: Metallic materials.*” ISO 11114-1:2012 provides requirements for the selection of safe combinations of metallic cylinder and valve materials and cylinder gas content. PHMSA is amending the compatibility requirements to also require compatibility with the 2017 supplement to ISO 11114-1:2012, (ISO 11114-1:2012/Amd 1:2017) for material compatibility requirements. Permitting the use of this document allows shippers to safely transport a wider variety of gases in newly developed types of metallic cylinders and valves. PHMSA has reviewed this document

³⁴ See, e.g., Special Permit 14457 (Dec. 16, 2019), which served as the technical basis for the development of ISO 11119-4:2016.

as part of its regular participation in the review of amendments for the 21st revised edition of the UNMR and expects that adding it to the HMR will enhance the current safety of hazardous materials in transportation, in addition to harmonizing the HMR with international requirements. This amendment provides compatibility requirements for the selection of combinations of metallic cylinder and valve materials for use with gas or gas mixtures. In the interest of providing uniformity with regard to reference standards used domestically and internationally, PHMSA is revising the compatibility requirements to also refer to the 2017 amendment of this ISO standard. This 2017 supplemental amendment provides more explicit instructions on the permissible concentrations of certain gases. PHMSA has determined that permitting the use of this updated document allows safe transport of a wider variety of gases in newly developed types of metallic cylinders and valves without compromising safety.

Section 178.75

Section 178.75 prescribes specifications for multiple element gas containers (MEGCs), which are assemblies of UN cylinders, tubes, or bundles of cylinders interconnected by a manifold and assembled within a framework. The term includes all service equipment and structural equipment necessary for the transport of gases including hazardous materials marked as Division 2.1 (such as compressed hydrogen). PHMSA revises paragraph (d) to permit explicitly the use of composite construction, which is allowed for other pressure vessels (i.e., cylinders), rather than limiting authorized material of construction for an MEGC to seamless steel as in the current HMR. Further, and in response to a comment from Luxfer Gas Cylinders to the NPRM, PHMSA is clarifying that composite cylinders constructed of carbon, fiberglass, or a hybrid composite can use any metallic liners or non-load sharing polymer liners and not just high strength aluminum liners. When the specifications for MEGCs were originally

created, there were no standards for composite pressure receptacles in the international transport standards or the HMR. In the decades since, standards for the use of ISO composite pressure receptacles have been developed and authorized. International standards did not consider a corresponding allowance to use these composite pressure receptacles as elements of MEGCs when the specifications were originally adopted. The 21st revised edition of the UNMR has been updated to include such an authorization and PHMSA is similarly allowing the use of composite pressure receptacles in MEGCs.

To that end, PHMSA is adding references to the following ISO design standards for composite MEGCs: ISO 11119-1:2012(E), “*Gas cylinders — Refillable composite gas cylinders and tubes — Design, construction and testing — Part 1: Hoop wrapped fibre reinforced composite gas cylinders and tubes up to 450 L*,” ISO 11119-2:2012(E), “*Gas cylinders — Refillable composite gas cylinders and tubes — Design, construction and testing — Part 2: Fully wrapped fibre reinforced composite gas cylinders and tubes up to 450 L with load-sharing metal liners*,” ISO 11119-3:2013(E), “*Gas cylinders — Refillable composite gas cylinders and tubes — Design, construction and testing — Part 3: Fully wrapped fibre reinforced composite gas cylinders and tubes up to 450 L with non-load-sharing metallic or non-metallic liners*” and ISO 11119-4:2016, “*Gas cylinders — Refillable composite gas cylinders — Design, construction and testing — Part 4: Fully wrapped fibre reinforced composite gas cylinders up to 150 L with load-sharing welded metallic liners*,” The 19th revised edition of the UNMR amended the definition of a tube to include composite construction and this revision also included standards for the construction of composite tubes. Due to the lack of any technical or safety concerns, the 21st revised edition of the UNMR included an amendment to the definition of MEGCs which provides for composite construction, in addition to stainless steel construction, and was not intended to exclude MEGCs. With these revisions, PHMSA expects that this will provide flexibility and opportunities for cost savings for manufacturers of MEGCs

without compromising safety. Additionally, authorizing alternative MEGC packaging construction provides flexibility in packaging selection for shippers that could facilitate the transportation of hydrogen or other gases that may be used to support clean energy alternatives.

Section 178.275

Section 178.275 outlines requirements and definitions pertaining to UN portable tanks intended for the transportation of liquid and solid hazardous materials.

Paragraph (i) specifies the capacity requirements for pressure relief devices that must be used on these portable tanks. The HMR specify a formula that can be used to determine the required total capacity for these pressure relief devices. The formula defines variable “U” as “thermal conductance of the insulation.” Discussions held by the UNSCOE³⁵ led to the conclusion that usage of the phrase “thermal conductance” associated with the variable “U” in this formula is misleading because, in general scientific usage, “conductance” is expressed in “kW. K⁻¹” and is not a surface factor. Leaving the formula description as it currently appears in the HMR may cause confusion for those who use it given that the correct term for the unit given is “heat transfer coefficient.” PHMSA is replacing the phrase “thermal conductance” with “heat transfer coefficient” so that “U” is defined as “heat transfer coefficient of the insulation” which is more appropriate for what is being calculated and is consistent with use of the formula in the UNMR. This ensures proper calculation of the total capacity for the pressure relief devices for these portable tanks.

³⁵ “Use of the terms “conductivity” and “conductance” in chapter 6.7”
<https://www.unece.org/fileadmin/DAM/trans/doc/2018/dgac10c3/ST-SG-AC.10-C.3-2018-56e.pdf>.

Section 178.505

Section 178.505 prescribes specifications for aluminum drums and paragraph (b) prescribes the construction requirements for those aluminum drums. PHMSA adds a new paragraph (b)(6) to specify conditions when internal protective coatings or treatments must be applied to these drums—consistent with requirements for other metal packagings, such as steel drums, as provided in § 178.504(b)(7) and aluminum and steel jerricans in § 178.511(b)(5). In response to the NPRM, RIPA provided comments in opposition to adding the new § 178.505(b)(6). RIPA believes that if adopted, this revision would require a manufacturer or reconditioner to apply “suitable internal protective coatings or treatments” to exposed parts of drums if needed to ensure compatibility with the lading and ensure that the applied coatings or treatments retain their protective properties under normal conditions of transport. RIPA believes that § 173.24(e) already obligates the offeror with ensuring compatibility between the packaging and the material it contains.

PHMSA finds that RIPA does not provide adequate justification for its preferred position. As noted in RIPA’s comments, similar requirements in the HMR already exist for steel drums in § 178.504(a)(7) and for aluminum and steel jerricans in §§ 178.504(b)(7) and 178.511(b)(5). PHMSA is not aware of issues voiced by offerors associated with these compatibility requirements that are already a part of packaging specification requirements in the HMR. Also, RIPA did not present any specific cases of cause for concern involving steel drums or aluminum or steel jerricans that are currently subject to this requirement in the HMR. As such, PHMSA declines to adopt RIPA’s comment and instead adopts the amendment to § 178.505(b)(6) as proposed.

As stated in the NPRM, PHMSA finds that since metals are susceptible to corrosion from exposure to certain chemicals (e.g., sodium hydroxide solution, or alkaline liquids), measures need to be taken to ensure the packaging is compatible with

the contents. Further, the general requirements for packagings in the HMR include a compatibility requirement such that even though certain packagings are specified in the HMR, it is—nevertheless—the responsibility of the person offering a hazardous material for transportation to ensure that such packagings are compatible with their contents. This applies particularly to corrosivity, permeability, softening, premature aging, and embrittlement (*see* § 173.24(e)).

As part of this final rule, PHMSA adds conditions specifying when internal protective coatings or treatments must be applied to metal drums that are not constructed of steel or aluminum. This addition is consistent with international standards covering UN 1B1 and 1B2 aluminum drums. PHMSA expects that this revision will improve consistency with regard to safety standards (e.g., packaging integrity) across similar packagings. Therefore, PHMSA is revising § 178.505(b)(6) to specify conditions when internal protective coatings or treatments must be applied to aluminum drums.

Section 178.506

Section 178.506 prescribes specifications for metal drums that are not made of steel or aluminum, and paragraph (b) prescribes the construction requirements for these drums. In the NPRM, PHMSA proposed to add a new paragraph (b)(6) to specify conditions when internal protective coatings or treatments must be applied to metal drums that are not constructed of steel or aluminum consistent with this requirement for specifications of other metal packagings. This new requirement mirrors the requirements to apply suitable internal protective coatings or treatments in § 178.504(b)(7) for steel drums and § 178.511(b)(5) for aluminum and steel jerricans. In response to the NPRM, RIPA provided the same comments to § 178.505(b)(6) for aluminum drums as for this § 178.506(b)(6) for metal drums not made of steel or aluminum. PHMSA's response is

the same as for the aluminum drums as discussed above in the Section 178.505 discussion.

As stated in the NPRM, PHMSA asserts that since metals are susceptible to corrosion from exposure to certain chemicals (e.g., sodium hydroxide solution, or alkaline liquids), PHMSA determined measures need to be taken to ensure the packaging is compatible with the contents. Further, the general requirements for packagings in the HMR include a compatibility requirement such that even though certain packagings are specified in the HMR, it is—nevertheless—the responsibility of the person offering a hazardous material for transportation to ensure that such packagings are compatible with their contents. This applies particularly to corrosivity, permeability, softening, premature aging, and embrittlement (*see* § 173.24(e)).

However, PHMSA expects that codifying specific conditions in which internal protective coatings or treatments must be applied to metal drums that are not constructed of steel or aluminum will provide needed consistency by providing uniform safety standards for similar packagings across the HMR and ensure safe packaging and transport within these metal drums. Therefore, PHMSA revises § 178.506(b)(6) to specify conditions when internal protective coatings or treatments must be applied to metal drums that are not constructed of steel or aluminum.

Section 178.609

Section 178.609 provides test requirements for packagings for infectious substances. PHMSA makes an editorial amendment in paragraph (g) to clarify the performance testing requirements for infectious substances packaging. Specifically, PHMSA is amending paragraph (g) to clarify that only one additional test is required for packages for infectious substances containing dry ice. The 21st revised edition of the UNMR made a similar clarification regarding the testing requirements for these

packagings and PHMSA has determined that the current HMR also contains conflicting language in § 178.609. Currently paragraph (g), which specifies additional testing requirement for packagings intended to contain dry ice, may be interpreted to either require five additional samples dropped once each, or one additional sample packaging dropped five times. However, requiring one sample to be dropped five times in one orientation would not be consistent with drop testing requirements applicable to other packagings. PHMSA amends paragraph (g) to clearly state only one additional sample must be dropped in a single orientation; namely, the orientation the tester determines would be most likely to result in failure of the packaging in light of the properties of the packaging and the test surface. PHMSA does not consider this revision to be technical, but editorial, with the intent of conveying the testing protocol, as it was designed, more clearly. For that reason, PHMSA does not expect any change in level of safety than what was originally intended. This revision simply results in a package being tested in line with the design of the original packaging test method.

Section 178.703

Section 178.703 describes the marking requirements for IBCs. In the NPRM, PHMSA proposed to amend two marking requirements in this section.

In paragraph (b)(6), which specifies additional marking requirements for composite IBCs, PHMSA proposed an amendment to specify that the required markings on inner receptacles of these packagings must either be readily visible while in the outer packaging or duplicated on the outer packaging to facilitate inspection verifying compliance with the applicable package performance standard marking requirements.

RIPA provided comments supportive of harmonizing § 178.703 of the HMR with the newly adopted UNMR provision to require inner receptacle markings of an IBC that are not visible to be duplicated on the outer packaging of the IBC. However, RIPA notes

that the proposed language contains an additional requirement that the duplicated inner receptacle mark appearing on the IBC body be identified as duplicating the inner receptacle marking. RIPA adds that PHMSA does not indicate the form this identification should take, which could lead to regulatory disharmony and enforcement confusion because these marks will likely differ from one another if left to the discretion of each IBC manufacturer and preprocessor. RIPA suggests that the proposed requirement ensure the duplicated inner mark is placed “near” the primary and additional marking and the mark itself to indicate it is a duplicate of the inner receptacle mark. RIBCA submitted a comment agreeing with the proposed amendment.

In response to the comments from RIPA and RIBCA, PHMSA clarifies that copying of the inner receptacle marking on the outer packaging must be consistent. PHMSA confirms it is permissible to include the “/B” mark to indicate that the inner receptacle mark is a duplicate marking. However, PHMSA does not agree it is necessary to require this additional information by way of regulatory text — PHMSA submits the guidance in this preamble discussion should suffice to elaborate on PHMSA’s intent in revising § 178.703. For clarification, it is expected that the marking replicated on the outer packaging of the IBC should be the same as the marking on the inner receptacle and placed in a visible location in the vicinity of the outer receptacle marking.

Therefore, PHMSA is revising § 178.703(b)(6) to require that markings on inner receptacles of composite IBCs must either be readily visible while in the outer packaging or duplicated on the outer packaging to facilitate inspection verifying compliance with the applicable package performance standard marking requirements.

In paragraph (b)(7), which outlines the marking requirements for IBCs that are designed to be stacked, PHMSA proposed to revise the language in paragraph (b)(7)(iv) to clarify the maximum stacking load requirements pertaining to each marking requirement. Currently paragraph (b)(7)(iv) indicates that the maximum permitted

stacking load “applicable when the IBC is in use,” must be displayed. In the NPRM, PHMSA made the case that this phrase may be misinterpreted to mean that the stacking load applies only to transportation, leading to these packagings being stacked inappropriately when not in transportation, such as in warehouse storage.

PHMSA received comments from RIBCA and RIPA on the IBC stacking mark. RIBCA generally agrees with the proposed revision but believes the words “applicable when the IBC is in use” is too ambiguous. RIBCA adds that the required marking for the stacking load limit specified in the UNMR is based on anticipated dynamic forces that may be encountered in transport and such potential forces are not present in other settings such as storage. RIPA also notes that higher stacking loads have not proven to pose a concern in storage where IBCs may safely be stacked with loads exceeding the marked limit. Additionally, RIPA suggests that PHMSA clarify this provision while remaining within the bounds of its regulatory authority by retaining the existing phrasing and simply replacing the word “use” with “transportation,” which includes storage incidental to movement.

PHMSA agrees with comments by RIBCA and RIPA that as proposed, the revision to (b)(7)(iv) goes beyond the statutory authority for regulations of hazardous materials in transportation and the intended regulation applying to the safety of stacking IBCs when transported in commerce. Therefore, PHMSA is adjusting the proposed amendment to § 178.703(b)(6) to revise the phrase “applicable when the IBC is in use” to instead read “applicable when the IBC is in transportation” to clarify that stacking loads should never be exceeded when in transportation including when stored incidental to movement. Clarifying the regulatory text regarding the proper handling of these packagings will provide an enhanced level of safety both during transport and during storage incidental to that transportation. This revision addresses RIPA and RIBCA’s concern that the stacking mark revision will affect IBCs while stacked in storage.

Section 178.705

Section 178.705 prescribes specifications for metal IBCs. Paragraph (c) outlines construction requirements and paragraph (c)(1)(iv) specifies the minimum wall thickness requirements for metal IBCs. Metal IBCs are currently the only type of IBCs for which there are minimum wall thickness requirements, which is likely a holdover from regulations for cubical tank containers, from which the metal IBCs were once derived.³⁶ In contrast, because of performance testing requirements' (i.e., drop, stack, and vibration) ability to demonstrate the integrity of the package, the 21st revised edition of the UNMR include an amendment which now provides that minimum wall thickness requirements apply only to metal IBCs that have a capacity of more than 1500 L (396 gallons), while metal IBCs with a volume of 1500 L or less are no longer subject to previous prescriptive minimum wall thickness requirements.

In the NPRM, PHMSA proposed to revise the minimum wall thickness requirements for metal IBCs with a volume of 1500 L or less to provide additional design and construction flexibility. This revision harmonizes the minimum wall thickness requirements for IBCs with the 21st revised edition of the UNMR. In response to this proposal, PHMSA received comments from Dow, DGAC, and RIBCA in support of revising the minimum wall thickness requirements in § 178.705.

Additionally, Dow, DGAC, and RIBCA all state their opposition to the alternative outlined in the NPRM for metal IBC wall thickness in § 171.23. The alternative for § 171.23 would have prescribed requirements for specific materials and packagings transported under incorporated international standards and prohibited transportation or offering for transportation of metal IBCs with a capacity of 1500 L or less. The

³⁶ Stainless Steel Container Association, Proposal on Minimum Wall Thickness for Metal IBCs Submitted to the Sub-Committee of Experts on the Transport of Dangerous Goods During the 54th Session (Sep. 7, 2018), <https://www.unece.org/fileadmin/DAM/trans/doc/2018/dgac10c3/ST-SG-AC.10-C.3-2018-96e.pdf>.

alternative would have applied when that transportation is made in accordance with the ICAO Technical Instructions, IMDG Code, Transport Canada TDG Regulations, or the IAEA Regulations. However, due to the fact that PHMSA did not receive any additional information in response to the questions presented in the NPRM, the alternative—as outlined in § 171.23 of the NPRM—is not being pursued at this time.

Therefore, PHMSA is revising the minimum wall thickness requirements in § 178.705 for metal IBCs with a volume of 1500 L or less. These revisions will provide additional design and construction flexibility. Additionally, this amendment will harmonize the HMR with the 21st revised edition of the UNMR.

Lastly, in response to the NPRM, RIPA notes that there are dozens of metal IBC styles in use today with capacities ranging from approximately 416 L (110 gallons) up to 1500 L (496 gallons) that are manufactured using several kinds of steels, including carbon steel and several varieties of stainless steel designed to carry highly corrosive and toxic materials. RIPA believes it would be beneficial if PHMSA took the time to assess the types and quantities of materials shipped in metal IBCs before determining if the existing metal thickness requirement should be dropped for these packagings.

PHMSA appreciates RIPA's comments and will take these comments into consideration for further action in the future. Additionally, PHMSA encourages RIPA to submit a petition for rulemaking in accordance with § 106.100 providing data and arguments for why PHMSA should or should not expand the minimum wall thickness criteria to other types and quantities of materials shipped in IBCs.

G. Part 180

Section 180.207

Section 180.207 outlines the requirements for the requalification of UN pressure receptacles. Paragraph (d) specifies the requalification procedures for various types of

UN cylinders but, consistent with historical approach of the UNMR, does not include any procedures for the periodic inspection of UN cylinder bundles. However, the 21st revised edition of the UNMR addressed that gap by adding a new reference document entitled ISO 20475: 2018 “*Gas cylinders — Cylinder bundles — Periodic inspection and testing.*” ISO 20475 provides detailed procedures for maintenance and periodic inspection of cylinder bundles.

PHMSA adds paragraph (d)(7) to reference ISO 20475:2018, “*Gas cylinders — Cylinder bundles — Periodic inspection and testing*” providing a requalification standard for UN cylinder bundles because requalification procedures may differ for bundles of cylinders versus individual cylinders. This document was developed based on the need for a standard specific to cylinder bundles which would allow these cylinders to be reintroduced into service for an extended period of time. PHMSA expects that incorporating by reference a safety standard for requalification will reduce business costs and environmental effects by allowing existing cylinders to be reintroduced into service for continued use. As a participant on the UNSCOE, this standard was reviewed by PHMSA and other international bodies for inclusion in the UNMR based on its need and safety merit. Incorporating by reference ISO 20475 in the HMR is necessary, not only for international harmonization, but also to address the lack of such a standard in the HMR.

Additionally, PHMSA is removing a reference to the outdated, third edition of ISO 10462(E), “*Gas cylinders — Transportable cylinders for dissolved acetylene — Periodic inspection and maintenance*” in paragraph (d)(3) used for the requalification of dissolved acetylene cylinders. Requalification is required in accordance with the third edition of ISO 10462:2013(E); however, requalification in accordance with the second edition was authorized until December 31, 2018, in § 180.207(d)(3). This date has since passed and, therefore, PHMSA is removing the reference from this section of the HMR.

Consistent with this revision, the incorporation by reference of the second edition is removed from § 171.7(w) of the HMR. Additionally, acetylene cylinders requalified in accordance with the second edition before December 31, 2018, must be subsequently requalified in accordance with referenced third edition. PHMSA expects that these amendments will enhance safety by providing cylinder users with the necessary guidelines for the continued use of UN cylinders.

The regulatory text references ISO 10462:2013(E), which was previously approved for incorporation by reference in this section, and no changes are being made to this standard.

VI. Regulatory Analyses and Notices

A. Statutory/Legal Authority for this Rulemaking

This final rule is published under the authority of Federal hazardous materials transportation law (49 U.S.C. 5101 *et seq.*), which authorizes the Secretary of Transportation to prescribe regulations for the safe transportation of hazardous materials—including security—in intrastate, interstate, and foreign commerce. Additionally, 49 U.S.C. 5120 authorizes the Secretary to consult with interested international authorities to ensure that, to the extent practicable, regulations governing the transportation of hazardous materials in commerce are consistent with the standards adopted by international authorities. The Secretary has delegated the authority granted in the Federal hazardous materials transportation law to the PHMSA Administrator at 49 CFR 1.97(b).

B. Executive Order 12866 and DOT Regulatory Policies and Procedures

Executive Order 12866 (“Regulatory Planning and Review”)³⁷ requires agencies to regulate in the “most cost-effective manner,” to make a “reasoned determination that the benefits of the intended regulation justify its costs,” and to develop regulations that “impose the least burden on society.” Similarly, DOT Order 2100.6A (“Policies and Procedures for Rulemakings”)³⁸ requires that PHMSA rulemaking actions include “an assessment of the potential benefits, costs, and other important impacts of the regulatory action,” and any significant distributional impacts, including any environmental impacts.

Executive Order 12866 and DOT Order 2100.6A require that PHMSA submit “significant regulatory actions” to OMB for review. This rulemaking is not considered a significant regulatory action under section 3(f) of Executive Order 12866 and, therefore, was not formally reviewed by OMB. This rulemaking is also not considered a significant rule under DOT Order 2100.6A.

The following is a brief summary of costs, savings, and net benefits of some of the amendments in this final rule. In the RIA, PHMSA developed a more detailed analysis of these costs and benefits, and a copy of it has been placed in the rulemaking docket.

PHMSA is amending the HMR to maintain alignment with international regulations and standards, thereby maintaining the high safety standard currently achieved under the HMR, facilitating the safe transportation of critical vaccines and other medical materials associated with the response to the COVID-19 public health emergency, and aligning HMR requirements with anticipated increases in the volume of lithium batteries transported in interstate commerce from electrification of the transportation and other economic sectors. PHMSA examined the likely impacts of finalizing and implementing the provisions in the final rule in order to assess the benefits

³⁷ 58 FR 51735 (Oct. 4, 1993).

³⁸ <https://www.transportation.gov/sites/dot.gov/files/2021-06/DOT-2100.6A-Rulemaking-and-Guidance-%28003%29.pdf>

and costs of these amendments. This analysis allowed PHMSA to quantitatively assess the material effects of three of the amendments in this final rule. The effects of six remaining amendments are not quantified but are assessed qualitatively.

PHMSA estimates that the annualized quantified net cost savings of this rulemaking, using a seven percent (7%) discount rate, are approximately \$24.5 to \$28.3 million per year. The table below presents a summary of the monetized impacts of changes made in this final rule. PHMSA notes that its estimated net cost savings below are consistent with the estimates within the Preliminary Regulatory Impact Assessment (PRIA) supporting the NPRM:

Summary Table of Net Regulatory Cost Savings, Discount Rate = 7%, 2022 – 2031 (\$2019)

Rule Amendments	10 Year Costs		10 Year Cost Savings		10 Year Net Cost Savings		Annual Costs		Annual Cost Savings		Annual Net Cost Savings	
	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High
Amendment 2: Electric and Electronic Detonators	\$637,197	\$862,238	0	0	(\$637,197)	(\$862,238)	\$90,723	\$122,763	0	0	(\$90,723)	(\$122,763)
Amendment 5: Lithium Battery Mark	0	0	\$166,458,847	\$171,243,943	\$166,458,847	\$171,243,943	0	0	\$23,699,995	\$24,381,285	\$23,699,995	\$24,381,285
Amendment 7: Data Loggers	0	0	\$6,443,740	\$28,443,710	\$6,443,740	\$28,443,710	0	0	\$917,444	\$4,094,744	\$917,444	\$4,094,744
Total	\$637,197	\$862,238	\$172,902,587	\$199,687,653	\$172,265,389	\$198,825,414	\$90,723	\$122,763	\$24,617,438	\$28,431,029	\$24,526,716	\$28,308,266

Although PHMSA received comments on its anticipated safety benefits in the rulemaking (discussed above in Section IV), PHMSA received one comment that hints at an overstatement of the benefits of the rule when considering the quantification of compliance costs, including increased training costs for compliance. However, the comment provided no quantifiable data to rebut the compliance costs PHMSA proposed in the PRIA. No additional comments were received from stakeholders on PHMSA's quantification of compliance costs and benefits within the PRIA. The safety and environmental benefits of the final rule have not been quantified. However, PHMSA expects these amendments will help to improve public safety and reduce the risk of environmental harm by maintaining consistency between these international regulations and the HMR. Harmonization of the HMR with international consensus standards may reduce delays and interruptions of hazardous materials during transportation, thereby lowering GHG emissions and safety risks to communities—including minority, low-income, underserved, and other disadvantaged populations and communities—in the vicinity of interim storage sites and transportation arteries and hubs.

C. Executive Order 13132

PHMSA analyzed this rulemaking in accordance with the principles and criteria contained in Executive Order 13132 (“Federalism”)³⁹ and the Presidential memorandum (“Preemption”) that was published in the Federal Register on May 22, 2009.⁴⁰ Executive Order 13132 requires agencies to assure meaningful and timely input by state and local officials in the development of regulatory policies that may have “substantial direct effects on the States, on the relationship between the national government and the States,

³⁹ 64 FR 43255 (Aug. 10, 1999).

⁴⁰ 74 FR 24693 (May 22, 2009).

or on the distribution of power and responsibilities among the various levels of government.”

The rulemaking may preempt state and local, and Native American Tribe requirements, but does not revise any regulation that has substantial direct effects on the States, the relationship between the national government and the States, or the distribution of power and responsibilities among the various levels of government. The federal hazardous materials transportation law contains an express preemption provision at 49 U.S.C.5125(b) that preempts state, local, and tribal requirements on certain covered subjects, unless the non-federal requirements are “substantively the same” as the federal requirements, including the following:

- (1) The designation, description, and classification of hazardous material;
- (2) The packing, repacking, handling, labeling, marking, and placarding of hazardous material;
- (3) The preparation, execution, and use of shipping documents related to hazardous material and requirements related to the number, contents, and placement of those documents;
- (4) The written notification, recording, and reporting of the unintentional release in transportation of hazardous material; and
- (5) The design, manufacture, fabrication, inspection, marking, maintenance, recondition, repair, or testing of a packaging or container represented, marked, certified, or sold as qualified for use in transporting hazardous material in commerce.

This final rule addresses covered subject items (1), (2), (3), (4), and (5) above and preempts State, local, and Tribal requirements not meeting the “substantively the same” standard. In this instance, the preemptive effect of the final rule is limited to the minimum level necessary to achieve the objectives of the hazardous materials

transportation law under which the final rule is promulgated. Therefore, the consultation and funding requirements of Executive Order 13132 do not apply.

D. Executive Order 13175

PHMSA analyzed this rulemaking in accordance with the principles and criteria contained in Executive Order 13175 (“Consultation and Coordination with Indian Tribal Governments”)⁴¹ and DOT Order 5301.1 (“Department of Transportation Policies, Programs, and Procedures Affecting American Indians, Alaska Natives, and Tribes”). Executive Order 13175 and DOT Order 5301.1 require DOT Operating Administrations to assure meaningful and timely input from Native American Tribal government representatives in the development of rules that significantly or uniquely affect Tribal communities by imposing “substantial direct compliance costs” or “substantial direct effects” on such communities or the relationship and distribution of power between the federal government and Native American Tribes.

PHMSA assessed the impact of the rulemaking and determined that it does not significantly or uniquely affect Tribal communities or Native American Tribal governments. The changes to the HMR as written in this final rule are facially neutral and have broad, national scope; PHMSA, therefore, expects this rulemaking not to significantly or uniquely affect Tribal communities, much less impose substantial compliance costs on Native American Tribal governments or mandate Tribal action. Because PHMSA expects the rulemaking will not adversely affect the safe transportation of hazardous materials generally, PHMSA does not expect it will entail disproportionately high adverse risks for Tribal communities. For these reasons, PHMSA finds the funding and consultation requirements of Executive Order 13175 and DOT Order 5301.1 do not apply.

⁴¹ 65 FR 67241 (Nov. 9, 2000).

E. Regulatory Flexibility Act and Executive Order 13272

The Regulatory Flexibility Act (5 U.S.C. 601 *et seq.*) requires agencies to review regulations to assess their impact on small entities, unless the agency head certifies that a rulemaking will not have a significant economic impact on a substantial number of small entities including small businesses, not-for-profit organizations that are independently owned and operated and are not dominant in their fields, and governmental jurisdictions with populations under 50,000. The Regulatory Flexibility Act directs agencies to establish exceptions and differing compliance standards for small businesses, where possible to do so and still meet the objectives of applicable regulatory statutes. Executive Order 13272 (“Proper Consideration of Small Entities in Agency Rulemaking”)⁴² requires agencies to establish procedures and policies to promote compliance with the Regulatory Flexibility Act and to “thoroughly review draft rules to assess and take appropriate account of the potential impact” of the rules on small businesses, governmental jurisdictions, and small organizations. The DOT posts its implementing guidance on a dedicated webpage.⁴³

This final rule has been developed in accordance with Executive Order 13272 and with DOT’s procedures and policies to promote compliance with the Regulatory Flexibility Act to ensure that potential impacts of draft rules on small entities are properly considered. This final rule facilitates the transportation of hazardous materials in international commerce by providing consistency with international standards. It applies to offerors and carriers of hazardous materials, some of whom are small entities, such as chemical manufacturers, users, and suppliers, packaging manufacturers, distributors, and

⁴² 67 FR 53461 (Aug. 16, 2002).

⁴³ DOT, “Rulemaking Requirements Related to Small Entities,” <https://www.transportation.gov/regulations/rulemaking-requirements-concerning-small-entities> (last accessed June 17, 2021).

training companies. As discussed at length in the RIA in the rulemaking docket, the amendments in this rule should result in net cost savings that will ease the regulatory compliance burden for those and other entities engaged in domestic and international commerce, including trans-border shipments within North America. Additionally, the changes in this final rule will relieve U.S. companies—including small entities competing in foreign markets—from the burden of complying with a dual system of regulations. Therefore, PHMSA certifies that these amendments will not, if adopted, have a significant economic impact on a substantial number of small entities.

F. Paperwork Reduction Act

PHMSA has analyzed this final rule in accordance with the Paperwork Reduction Act. PHMSA currently accounts for shipping paper burdens under OMB Control Number 2137-0034, “Hazardous Materials Shipping Papers and Emergency Response Information.” PHMSA makes a number of amendments that may impact the burden accounted for in OMB Control Number 2137-0034. They include requiring the word “stabilized” as a part of the proper shipping name for “UN2522, 2-Dimethylaminoethyl methacrylate,” adding the applicable term “DAMAGED/DEFECTIVE,” “LITHIUM BATTERIES FOR DISPOSAL” or “LITHIUM BATTERIES FOR RECYCLING,” excepting marine pollutants from the requirement to supplement the proper shipping name with a technical name for UN3077 and UN3082 and requiring documentation of the holding time for refrigerated liquefied gases transported in portable tanks. However, while PHMSA estimates that there will be some impact in the annual burden related to shipping papers, PHMSA expects the overall impact to annual burden is negligible in relation to the number of burden hours currently associated with this information collection.

OMB Control Number 2137-0051, “Rulemaking, Special Permits, and Preemption Requirements,” currently accounts for burden associated with petitions for rulemaking, special permit applications, and preemption requests. PHMSA is authorizing certain ISO standard valves in § 173.301b(c)(2) and expands § 175.10 to allow passenger and crewmembers to carry certain Division 2.2 aerosols in carry-on baggage, both of which eliminate the need for use of a special permit. While PHMSA expects these revisions to reduce the burden associated with this information collection, PHMSA anticipates the reduction is negligible in relation to the total burden hours associated with special permit applications.

PHMSA accounts for the burden from approval applications in OMB Control Number 2137-0557, “Approvals for Hazardous Materials.” PHMSA is adding a new HMT entry for “UN3549, Medical Waste, Category A, Affecting Humans, *solid or* Medical Waste, Category A, Affecting Animals *only, solid*” and require an approval for transportation in accordance with Special Provision 131, which PHMSA expects will increase the number of annual approval applicants. PHMSA also is adding new entries to the § 173.225 Organic Peroxide Table, which PHMSA expects will decrease the number of annual approval applicants. Overall, PHMSA expects that these changes are negligible to the overall impact of the total burden in relation to the number of burden hours associated with this information collection.

G. Unfunded Mandates Reform Act of 1995

The Unfunded Mandates Reform Act of 1995 (UMRA; 2 U.S.C. 1501 *et seq.*) requires agencies to assess the effects of Federal regulatory actions on State, local, and Tribal governments, and the private sector. For any NPRM or final rule that includes a federal mandate that may result in the expenditure by State, local, and Tribal governments, or by the private sector of \$100 million or more in 1996 dollars in any

given year, the agency must prepare, amongst other things, a written statement that qualitatively and quantitatively assesses the costs and benefits of the Federal mandate.

As explained in the RIA, this rulemaking does not impose unfunded mandates under the UMRA. It does not result in costs of \$100 million or more in 1996 dollars to either State, local, or Tribal governments, or to the private sector, in any one year. A copy of the RIA is available for review in the rulemaking docket.

H. Environmental Assessment

The National Environmental Policy Act of 1969 (NEPA; 42 U.S.C. 4321 *et seq.*), requires that Federal agencies analyze actions to determine whether the action will have a significant impact on the human environment. The Council on Environmental Quality implementing regulations—i.e., 40 CFR parts 1500-1508—require Federal agencies to conduct an environmental review considering: (1) the need for the action; (2) alternatives to the action; (3) probable environmental impacts of the action and alternatives; and (4) the agencies and persons consulted during the consideration process. DOT Order 5610.1C (“Procedures for Considering Environmental Impacts”) establishes departmental procedures for evaluation of environmental impacts under NEPA and its implementing regulations.

1. PURPOSE AND NEED

This final rule amends the HMR to maintain alignment with international consensus standards by incorporating into the HMR various amendments, including changes to proper shipping names, hazard classes, packing groups, special provisions, packaging authorizations, air transport quantity limitations, and vessel stowage requirements. PHMSA notes that the amendments in this final rule are expected to result in cost savings and reduced regulatory burden for shippers engaged in domestic and international commerce, including trans-border shipments within North America. Absent

adoption of the amendments in the final rule, U.S. companies—including numerous small entities competing in foreign markets—may be at an economic disadvantage because of their need to comply with a dual system of regulations. Further, the HMR amendments introduced in this rulemaking align HMR requirements with anticipated increases in the volume of lithium batteries transported in interstate commerce from electrification of the transportation and other economic sectors that are expected to reduce the emission of greenhouse gases from the transportation sector.

As previously explained in the preamble of this final rule and the RIA (each of which are incorporated by reference in this discussion of the environmental impacts of the Selected Action Alternative), PHMSA expects the adoption of the regulatory amendments in this final rule to maintain the high safety standard currently achieved under the HMR. PHMSA has evaluated the safety of each of the amendments in this final rule individually, as well as the aggregate impact on transportation safety from adoption of this final rule. PHMSA received no comments on the draft environmental assessment within the NPRM's discussion of NEPA.

2. ALTERNATIVES CONSIDERED

In this rulemaking, PHMSA considered the following alternatives:

Alternative #1: No Action

If PHMSA were to select the No Action Alternative, current regulations remain in place and no provisions will be amended or added.

Alternative #2: Amend the HMR as Provided in This Final Rule

The final Rule Alternative would adopt the HMR amendments set forth in this final rule, and was previously referred to as the “Proposed Action Alternative” in the draft environmental assessment (DEA) that was included within the NPRM. The amendments included in this alternative are more fully discussed in the preamble and regulatory text sections of this final rule.

3. REASONABLY FORESEEABLE ENVIRONMENTAL IMPACTS OF THE ALTERNATIVES

Alternative #1: No Action

After careful consideration of public comments on the NPRM (none of which directly addressed the draft environmental assessment), and revised analyses of economic and environmental impacts of the Proposed Action Alternative, PHMSA has adopted the Proposed Action Alternative (i.e., the final rule) as the Selected Action. If PHMSA selected the No Action Alternative, the HMR would remain unchanged, and no provisions would be amended or added. However, any economic benefits gained through harmonization of the HMR with updated international consensus standards—including, but not limited to, the 21st revised edition of the UNMR, the 2021-2022 ICAO Technical Instructions and Amendment 40-20 of the IMDG Code—governing shipping of hazardous materials would not be realized.

Additionally, the No Action Alternative would not adopt enhanced and clarified regulatory requirements expected to maintain the high level of safety in the transportation of hazardous materials as provided by the HMR. As explained in the preamble to the NPRM and the final rule, consistency between the HMR and current international standards can enhance safety by (1) ensuring that the HMR is informed by the latest best practices and lessons learned; (2) improving understanding of and compliance with pertinent requirements; (3) enabling consistent emergency response procedures in the event of a hazardous materials incident; and (4) facilitating the smooth flow of hazardous materials from their points of origin to their points of destination. Avoiding delays, interruptions, or reshipments associated with inconsistencies between the HMR and international standards prevents environmental impacts from: (1) increased risk of release of hazardous materials during extra stops or pauses in transportation and (2) additional fuel combustion and degradation of transportation infrastructure. PHMSA would not capture

those benefits if it did not incorporate the updated international standards into the HMR under the No Action Alternative.

Additionally, some of the HMR amendments are expected to better accommodate the safe transportation of emerging technologies—in particular lithium battery technologies and adding shipping paper requirements intended to reduce the likelihood of venting refrigerated gases, including extremely potent greenhouse gases such as nitrous oxide. As explained in the RIA, PHMSA expects a significant increase in the volume of shipments of lithium batteries over time as more sectors of the U.S. domestic and international economies electrify. PHMSA's HMR amendments pertaining to lithium batteries—which touch on multiple stages in the lifecycle of a lithium battery—are intended to ensure that expansion occurs safely. The No Action Alternative, in contrast, would not amend the HMR to account for these emerging trends in the transportation of hazardous materials.

PHMSA notes that the No Action Alternative would avoid any risks to public safety and the environment from the proposed authorization of shipments of hazardous materials offered pursuant to temporary certificates issued by Transport Canada. While the transportation of hazardous materials always entails some risk, allowing the transportation of hazardous materials pursuant to temporary certificates issued by Transport Canada could facilitate shipments of hazardous materials that are not otherwise compliant with the HMR and do not meet an equivalent standard of safety. Arguably, this allowance could entail greater risks to public safety and the environment. However, based on years of collaboration, PHMSA considers Transport Canada to be a partner in hazardous materials safety and has confidence in the technical expertise and judgement of the hazardous materials safety SMEs at Transport Canada. PHMSA further submits that any risks are mitigated by (1) the technical review by Transport Canada subject matter experts to determine any shipments would be in the public interest, (2) the limited

duration of those temporary certificates, (3) the terms and conditions imposed in those certificates, (4) other regulatory requirements under the TDG Regulations or the HMR that may remain applicable, and (5) PHMSA's limitation of its recognition of temporary certificates to transportation via motor carrier and rail during the particular shipment authorized by a temporary certificate.

PHMSA expects that the No Action Alternative could have a modest negative impact on GHG emissions. PHMSA expects the differences between the HMR and international standards for transportation of hazardous materials could result in transportation delays or interruptions and anticipates that there could be modestly higher GHG emissions from some combination of (1) transfer of delayed hazardous materials to and from interim storage, (2) return of improperly shipped materials to their point of origin, and (3) re-shipment of returned materials. Also, this final rule creates requirements for the shipment of refrigerated gases, including highly potent greenhouse gases, to inform shippers and carriers about when the gases will begin venting, which could facilitate planning to prevent these environmentally harmful releases. PHMSA notes that it is unable to quantify such GHG emissions because of the difficulty in identifying the precise quantity or characteristics of such interim storage or returns/re-shipments.

Final Rule Alternative

As described above, PHMSA expects the Selected Action will yield superior benefits (cost benefits for shippers and carriers; public safety and environmental benefits; equity benefits) compared to the No Action Alternative.

4. AGENCIES CONSULTED

PHMSA expects this final rule would affect hazardous materials shippers and carriers by highway, rail, vessel, and aircraft, as well as package manufacturers and testers. PHMSA has coordinated with the Federal Aviation Administration, the Federal

Motor Carrier Safety Administration, the Federal Railroad Administration, and the United States Coast Guard in the development of this final rule. As such, PHMSA did not receive any adverse comments on the amendments in this final rule from these or any other Federal Agencies.

5. CONCLUSION

PHMSA has determined the adoption of the Final Rule Alternative's regulatory amendments within this final rule will maintain the HMR's current high level of safety for shipments of hazardous materials transported by highway, rail, air, and vessel, and as such finds the HMR amendments adopted in the final rule will have no significant impact on the human environment.

I. Executive Order 12898

DOT Order 5610.2C (Department of Transportation Actions to Address Environmental Justice in Minority Populations and Low-Income Populations") and Executive Orders 12898 ("Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations"),⁴⁴ 13985 ("Advancing Racial Equity and Support for Underserved Communities Through the Federal Government"),⁴⁵ 13990 ("Protecting Public Health and the Environment and Restoring Science To Tackle the Climate Crisis"),⁴⁶ and 14008 ("Tackling the Climate Crisis at Home and Abroad")⁴⁷ require DOT agencies to achieve environmental justice as part of their mission by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects, including interrelated social and economic effects of

⁴⁴ 59 FR 7629 (Feb. 11, 1994).

⁴⁵ 86 FR 7009 (Jan. 20, 2021).

⁴⁶ 86 FR 7037 (Jan. 20, 2021).

⁴⁷ 86 FR 7619 (Feb. 1, 2021).

their programs, policies, and activities on minority populations, low-income populations, and other underserved and disadvantaged communities.

PHMSA has evaluated this final rule under the above Executive Orders and DOT Order 5610.2C. PHMSA does not expect the final rule to cause disproportionately high and adverse human health and environmental effects on minority, low-income, underserved, and other disadvantaged populations, and communities. The rulemaking is facially neutral and national in scope; it is neither directed toward a particular population, region, or community, nor is it expected to adversely impact any particular population, region, or community. And because PHMSA expects the rulemaking would not adversely affect the safe transportation of hazardous materials generally, PHMSA does not expect the revisions to involve disproportionately high adverse risks for minority populations, low-income populations, or other underserved and other disadvantaged communities.

PHMSA submits that the rulemaking could in fact reduce risks to minority populations, low-income populations, or other underserved and other disadvantaged communities. Because the HMR amendments may avoid the release of hazardous materials and reduce the frequency of delays and returned/resubmitted shipments of hazardous materials resulting from conflict between the current HMR and updated international standards, the final rule could reduce risks to populations and communities—including any minority, low-income, underserved and other disadvantaged populations and communities—in the vicinity of interim storage sites and transportation arteries and hubs. Additionally, as explained in the above discussion of NEPA, PHMSA expects that its HMR amendments will yield modest GHG emissions reductions, thereby reducing the risks posed by anthropogenic climate change to minority, low-income, underserved, and other disadvantaged populations, and communities.

J. Privacy Act

In accordance with 5 U.S.C. 553(c), DOT solicits comments from the public to better inform its rulemaking process. DOT posts these comments, without edit, including any personal information the commenter provides, to www.regulations.gov, as described in the system of records notice (DOT/ALL-14 FDMS). DOT's complete Privacy Act Statement is in the Federal Register published on April 11, 2000,⁴⁸ or on DOT's website at <http://www.dot.gov/privacy>.

K. Executive Order 13609 and International Trade Analysis

Executive Order 13609 ("Promoting International Regulatory Cooperation")⁴⁹ requires that agencies consider whether the impacts associated with significant variations between domestic and international regulatory approaches are unnecessary or may impair the ability of American business to export and compete internationally. In meeting shared challenges involving health, safety, labor, security, environmental, and other issues, international regulatory cooperation can identify approaches that are at least as protective as those that are or would be adopted in the absence of such cooperation. International regulatory cooperation can also reduce, eliminate, or prevent unnecessary differences in regulatory requirements.

Similarly, the Trade Agreements Act of 1979 (Pub. L. 96-39), as amended by the Uruguay Round Agreements Act (Pub. L. 103-465) (as amended, the Trade Agreements Act), prohibits agencies from establishing any standards or engaging in related activities that create unnecessary obstacles to the foreign commerce of the United States. Pursuant to the Trade Agreements Act, the establishment of standards is not considered an

⁴⁸ 65 FR 19477 (Apr. 11, 2000).

⁴⁹ 77 FR 26413 (May. 4, 2012).

unnecessary obstacle to the foreign commerce of the United States, so long as the standards have a legitimate domestic objective, such as providing for safety, and do not operate to exclude imports that meet this objective. The statute also requires consideration of international standards and, where appropriate, that they be the basis for U.S. standards.

PHMSA participates in the establishment of international standards to protect the safety of the American public, and it has assessed the effects of the final rule to ensure that it does not cause unnecessary obstacles to foreign trade. In fact, the final rule is expected to facilitate international trade by harmonizing U.S. and international requirements for the transportation of hazardous materials so as to reduce regulatory burdens and minimize delays arising from having to comply with divergent regulatory requirements. Accordingly, this rulemaking is consistent with Executive Order 13609 and PHMSA's obligations under the Trade Agreements Act.

L. National Technology Transfer and Advancement Act

The National Technology Transfer and Advancement Act of 1995 (15 U.S.C. 272 note) directs Federal agencies to use voluntary consensus standards in their regulatory activities unless doing so would be inconsistent with applicable law or otherwise impractical. Voluntary consensus standards are technical standards (e.g., specification of materials, test methods, or performance requirements) that are developed or adopted by voluntary consensus standard bodies. This rulemaking involves multiple voluntary consensus standards which are discussed at length in the discussion on § 171.7. *See* SECTION 171.7 of the "V. Section-by-Section Review of Amendments" for further details.

List of Subjects

49 CFR Part 171

Exports, Hazardous materials transportation, Hazardous waste, Imports, Incorporation by reference, Reporting and recordkeeping requirements.

49 CFR Part 172

Education, Hazardous materials transportation, Hazardous waste, Incorporation by reference, Labeling, Markings, Packaging and containers, Reporting and recordkeeping requirements.

49 CFR Part 173

Hazardous materials transportation, Incorporation by reference, Packaging and containers, Radioactive materials, Reporting and recordkeeping requirements, Uranium.

49 CFR Part 175

Air carriers, Hazardous materials transportation, Radioactive materials, Reporting and recordkeeping requirements.

49 CFR Part 176

Maritime carriers, Hazardous materials transportation, Incorporation by reference, Radioactive materials, Reporting and recordkeeping requirements.

49 CFR Part 178

Hazardous materials transportation, Incorporation by reference, Motor vehicle safety, Packaging and containers, Reporting and recordkeeping requirements.

49 CFR Part 180

Hazardous materials transportation, Motor carriers, Motor vehicle safety, Packaging and containers, Railroad safety, Reporting and recordkeeping requirements.

In consideration of the foregoing, PHMSA amends 49 CFR chapter I as follows:

PART 171—GENERAL INFORMATION, REGULATIONS, AND DEFINITIONS

1. The authority citation for part 171 continues to read as follows:

Authority: 49 U.S.C. 5101–5128, 44701; Pub. L. 101-410 section 4; Pub. L. 104-134, section 31001; Pub. L. 114-74 section 4 (28 U.S.C. 2461 note); 49 CFR 1.81 and 1.97.

2. In § 171.7:

- a. Revise paragraphs (a), (s)(1), (t)(1), (v)(2), and (w)(38) through (77);
- b. Add paragraphs (w)(78) through (81); and
- c. Revise paragraphs (aa) introductory text, (aa)(3), and (dd)(1) through (4).

The revisions and additions read as follows:

§ 171.7 Reference material.

(a) Certain material is incorporated by reference into subchapters A, B, and C with the approval of the Director of the Federal Register in accordance with 5 U.S.C. 552(a) and 1 CFR part 51. To enforce any edition other than that specified in this section, PHMSA must publish a document in the Federal Register and the material must be available to the public. All approved incorporation by reference (IBR) material is available for inspection at PHMSA and at the National Archives and Records Administration (NARA). Contact PHMSA at: The Office of Hazardous Materials Safety, Office of Hazardous Materials Standards, East Building, PHH-10, 1200 New Jersey Avenue SE., Washington, DC 20590-0001. For information on the availability of this

material at PHH-10, call 1-800-467-4922, or go to: www.phmsa.dot.gov. For information on the availability of this material at NARA, email: fr.inspection@nara.gov, or go to: www.archives.gov/federal-register/cfr/ibr-locations.html. The material may be obtained from the source(s) in the following paragraph(s) of this section.

* * * *

(s) * *

(1) IAEA Safety Standards for Protecting People and the Environment; Regulations for the Safe Transport of Radioactive Material, Specific Safety Requirements No. SSR-6 (Rev.1), (IAEA Regulations), 2018 Edition, copyright 2018; into §§ 171.22; 171.23; 171.26; 173.415 through 173.417; 173.435; 173.473.

* * * *

(t) * *

(1) ICAO Doc 9284. Technical Instructions for the Safe Transport of Dangerous Goods by Air (ICAO Technical Instructions), 2021-2022 Edition, copyright 2020; into §§ 171.8; 171.22 through 171.24; 172.101; 172.202; 172.401; 172.407; 172.512; 172.519; 172.602; 173.56; 173.320; 175.10, 175.33; 178.3.

* * * *

(v) * *

(2) International Maritime Dangerous Goods Code (IMDG Code), Incorporating Amendment 40-20 (English Edition), (Volumes 1 and 2), 2020 Edition, copyright 2020; into §§ 171.22; 171.23; 171.25; 172.101; 172.202; 172.203; 172.401; 172.407; 172.502; 172.519; 172.602; 173.21; 173.56; 176.2; 176.5; 176.11; 176.27; 176.30; 176.83; 176.84; 176.140; 176.720; 176.906; 178.3; 178.274.

(w) * *

(38) ISO 10156:2017(E), Gas cylinders — Gases and gas mixtures — Determination of fire potential and oxidizing ability for the selection of cylinder valve outlets, Fourth edition, 2017-07; into § 173.115.

(39) ISO 10297:1999(E), Gas cylinders—Refillable gas cylinder valves— Specification and type testing, First Edition, 1995-05-01; into §§ 173.301b; 178.71.

(40) ISO 10297:2006(E), Transportable gas cylinders—Cylinder valves— Specification and type testing, Second Edition, 2006-01-15; into §§ 173.301b; 178.71.

(41) ISO 10297:2014(E), Gas cylinders—Cylinder valves—Specification and type testing, Third Edition, 2014-07-15; into §§ 173.301b; 178.71.

(42) ISO 10297:2014/Amd 1:2017(E), Gas cylinders—Cylinder valves— Specification and type testing — Amendment 1: Pressure drums and tubes, Third Edition, 2017-03; into §§ 173.301b; 178.71.

(43) ISO 10461:2005(E), Gas cylinders—Seamless aluminum-alloy gas cylinders—Periodic inspection and testing, Second Edition, 2005-02-15 and Amendment 1, 2006-07-15; into § 180.207.

(44) ISO 10462:2013(E), Gas cylinders — Acetylene cylinders — Periodic inspection and maintenance, Third edition, 2013-12-15; into § 180.207.

(45) ISO 10692-2:2001(E), Gas cylinders — Gas cylinder valve connections for use in the micro-electronics industry — Part 2: Specification and type testing for valve to cylinder connections, First Edition, 2001-08-01; into §§ 173.40; 173.302c.

(46) ISO 11114-1:2012(E), Gas cylinders — Compatibility of cylinder and valve materials with gas contents — Part 1: Metallic materials, Second edition, 2012-03-15; into §§ 172.102; 173.301b; 178.71.

(47) ISO 11114-1:2012/Amd 1:2017(E), Gas cylinders — Compatibility of cylinder and valve materials with gas contents — Part 1: Metallic materials — Amendment 1, Second Edition, 2017-01; into §§ 172.102, 173.301b, 178.71.

(48) ISO 11114-2:2013(E), Gas cylinders—Compatibility of cylinder and valve materials with gas contents—Part 2: Non-metallic materials, Second edition, 2013-04; into §§ 173.301b; 178.71.

(49) ISO 11117:1998(E): Gas cylinders—Valve protection caps and valve guards for industrial and medical gas cylinders—Design, construction and tests, First edition, 1998-08-01; into § 173.301b.

(50) ISO 11117:2008(E): Gas cylinders—Valve protection caps and valve guards—Design, construction and tests, Second edition, 2008-09-01; into § 173.301b.

(51) ISO 11117:2008/Cor.1:2009(E): Gas cylinders—Valve protection caps and valve guards—Design, construction and tests, Technical Corrigendum 1, 2009-05-01; into § 173.301b.

(52) ISO 11118(E), Gas cylinders—Non-refillable metallic gas cylinders—Specification and test methods, First edition, October 1999; into § 178.71.

(53) ISO 11118:2015(E), Gas cylinders—Non-refillable metallic gas cylinders—Specification and test methods, Second edition, 2015-09-15; into §§ 173.301b; 178.71.

(54) ISO 11119-1(E), Gas cylinders—Gas cylinders of composite construction—Specification and test methods—Part 1: Hoop-wrapped composite gas cylinders, First edition, May 2002; into § 178.71.

(55) ISO 11119-1:2012(E), Gas cylinders—Refillable composite gas cylinders and tubes—Design, construction and testing— Part 1: Hoop wrapped fibre reinforced composite gas cylinders and tubes up to 450 l, Second edition, 2012-08-01; into §§ 178.71; 178.75.

(56) ISO 11119-2(E), Gas cylinders—Gas cylinders of composite construction—Specification and test methods—Part 2: Fully wrapped fibre reinforced composite gas cylinders with load-sharing metal liners, First edition, May 2002; into § 178.71.

(57) ISO 11119-2:2012(E), Gas cylinders—Refillable composite gas cylinders and tubes—Design, construction and testing—Part 2: Fully wrapped fibre reinforced composite gas cylinders and tubes up to 450 l with load-sharing metal liners, Second edition, 2012-07-15; into §§ 178.71; 178.75.

(58) ISO 11119-2:2012/Amd.1:2014(E), Gas cylinders—Refillable composite gas cylinders and tubes—Design, construction and testing—Part 2: Fully wrapped fibre reinforced composite gas cylinders and tubes up to 450 l with load-sharing metal liners, Amendment 1, 2014-08-15; into §§ 178.71; 178.75.

(59) ISO 11119-3(E), Gas cylinders of composite construction—Specification and test methods—Part 3: Fully wrapped fibre reinforced composite gas cylinders with non-load-sharing metallic or non-metallic liners, First edition, September 2002; into § 178.71.

(60) ISO 11119-3:2013(E), Gas cylinders— Refillable composite gas cylinders and tubes—Design, construction and testing—Part 3: Fully wrapped fibre reinforced composite gas cylinders and tubes up to 450 l with non-load-sharing metallic or non-metallic liners, Second edition, 2013-04-15; into §§ 178.71; 178.75.

(61) ISO 11119-4:2016(E), Gas cylinders — Refillable composite gas cylinders — Design, construction and testing — Part 4: Fully wrapped fibre reinforced composite gas cylinders up to 150 L with load-sharing welded metallic liners, First Edition, 2016-02-15; into § 178.71; 178.75.

(62) ISO 11120(E), Gas cylinders — Refillable seamless steel tubes of water capacity between 150 l and 3000 l — Design, construction and testing, First edition, 1999-03; into §§ 178.71; 178.75.

(63) ISO 11120:2015(E), Gas cylinders — Refillable seamless steel tubes of water capacity between 150 l and 3000 l — Design, construction and testing, Second Edition, 2015-02-01; into §§ 178.71; 178.75.

(64) ISO 11513:2011(E), Gas cylinders — Refillable welded steel cylinders containing materials for sub-atmospheric gas packaging (excluding acetylene) — Design, construction, testing, use and periodic inspection, First edition, 2011-09-12; into §§ 173.302c; 178.71; 180.207.

(65) ISO 11621(E), Gas cylinders—Procedures for change of gas service, First edition, April 1997; into §§ 173.302, 173.336, 173.337.

(66) ISO 11623(E), Transportable gas cylinders—Periodic inspection and testing of composite gas cylinders, First edition, March 2002; into § 180.207.

(67) ISO 11623(E):2015, Gas cylinders—Composite construction—Periodic inspection and testing, Second edition, 2015-12-01; into § 180.207.

(68) ISO 13340:2001(E), Transportable gas cylinders—Cylinder valves for non-refillable cylinders—Specification and prototype testing, First edition, 2004-04-01; into §§ 173.301b; 178.71.

(69) ISO 13736:2008(E), Determination of flash point—Abel closed-cup method, Second Edition, 2008-09-15; into § 173.120.

(70) ISO 14246:2014(E), Gas cylinders—Cylinder valves—Manufacturing tests and examination, Second Edition, 2014-06-15; into § 178.71.

(71) ISO 14246:2014/Amd 1:2017(E), Gas cylinders – Cylinder valves – Manufacturing tests and examinations –Amendment 1, Second Edition, 2017-06; into § 178.71.

(72) ISO 16111:2008(E), Transportable gas storage devices—Hydrogen absorbed in reversible metal hydride, First Edition, 2008-11-15; into §§ 173.301b; 173.311; 178.71.

(73) ISO 16148:2016(E), Gas cylinders—Refillable seamless steel gas cylinders and tubes—Acoustic emission examination (AT) and follow-up ultrasonic examination (UT) for periodic inspection and testing, Second Edition, 2016-04-15; into § 180.207.

(74) ISO 17871:2015(E), Gas cylinders — Quick-release cylinder valves — Specification and type testing, First Edition, 2015-08-15; into § 173.301b.

(75) ISO 17879: 2017(E), Gas cylinders — Self-closing cylinder valves — Specification and type testing, First Edition, 2017-07; into §§ 173.301b;178.71.

(76) ISO 18172-1:2007(E), Gas cylinders—Refillable welded stainless steel cylinders—Part 1: Test pressure 6 MPa and below, First Edition, 2007-03-01; into § 178.71.

(77) ISO 20475:2018(E), Gas cylinders — Cylinder bundles — Periodic inspection and testing, First Edition, 2018-02; into § 180.207.

(78) ISO 20703:2006(E), Gas cylinders—Refillable welded aluminum-alloy cylinders—Design, construction and testing, First Edition, 2006-05-01; into § 178.71.

(79) ISO 21172-1:2015(E), Gas cylinders — Welded steel pressure drums up to 3000 litres capacity for the transport of gases — Design and construction —Part 1: Capacities up to 1000 litres, First edition, 2015-04-01; into § 178.71.

(80) ISO 22434:2006(E), Transportable gas cylinders—Inspection and maintenance of cylinder valves, First Edition, 2006-09-01; into § 180.207.

(81) ISO/TR 11364:2012(E), Gas cylinders—Compilation of national and international valve stem/gas cylinder neck threads and their identification and marking system, First Edition, 2012-12-01; into § 178.71.

* * * *

(aa) Organization for Economic Cooperation and Development (OECD), OECD Publications and Information Center, 2001 L Street, N.W., Suite 700, Washington, DC 20036; (+33 1 45 24 82 00, <https://www.oecd.org/>).

* * * *

(3) OECD Guideline for the Testing of Chemicals 431 (Test No. 431): In vitro skin corrosion: reconstructed human epidermis (RHE) test method, adopted 29 July 2016; into § 173.137.

* * * * *

(dd) * * *

(1) Recommendations on the Transport of Dangerous Goods, Model Regulations (UN Recommendations), 21st revised edition, copyright 2019; into §§ 171.8; 171.12; 172.202; 172.401; 172.407; 172.502; 172.519; 173.22; 173.24; 173.24b; 173.40; 173.56; 173.192; 173.302b; 173.304b; 178.75; 178.274; as follows:

(i) Volume I, ST/SG/AC.10.1/21/Rev.21 (Vol.I).

(ii) Volume II, ST/SG/AC.10.1/21/Rev.21 (Vol.II).

(2) Manual of Tests and Criteria (UN Manual of Tests and Criteria), 7th revised edition, ST/SG/AC.10/11/Rev.7, copyright 2019; into §§ 171.24, 172.102; 173.21; 173.56 through 173.58; 173.60; 173.115; 173.124; 173.125; 173.127; 173.128; 173.137; 173.185; 173.220; 173.221; 173.224; 173.225; 173.232; part 173, appendix H; 175.10; 176.905; 178.274.

(3) Globally Harmonized System of Classification and Labelling of Chemicals (GHS), 8th revised edition, ST/SG/AC.10/30/Rev.8, copyright 2019; into § 172.401.

(4) Agreement concerning the International Carriage of Dangerous Goods by Road (ADR), copyright 2020; into § 171.23; as follows:

(i) Volume I, ECE/TRANS/300 (Vol. I).

(ii) Volume II, ECE/TRANS/300 (Vol. II).

(iii) Corrigendum, ECE/TRANS/300 (Corr. 1).

* * * * *

3. In § 171.8, revise the definitions for “SADT” and “SAPT” to read as follows:

§ 171.8 Definitions and abbreviations.

* * * * *

SADT means self-accelerated decomposition temperature and is the lowest temperature at which self-accelerating decomposition may occur in a substance in the packaging, IBC, or portable tank offered for transport. *See* also § 173.21(f) of this subchapter.

* * * * *

SAPT means self-accelerated polymerization temperature and is the lowest temperature at which self-accelerating polymerization may occur with a substance in the packaging, IBC, or portable tank as offered for transport. *See* also § 173.21(f) of this subchapter. This definition will be effective until January 2, 2023.

* * * * *

4. In § 171.12, revise paragraph (a)(1) to read as follows:

§ 171.12 North American Shipments.

(a) * * *

(1) *Applicability.* A hazardous material transported from Canada to the United States, from the United States to Canada, or transiting the United States to Canada or a foreign destination may be offered for transportation or transported by motor carrier and rail in accordance with the Transport Canada TDG Regulations (IBR, *see* § 171.7), an equivalency certificate (permit for equivalent level of safety), or a temporary certificate (permit in support of public interest) issued by Transport Canada as an alternative to the TDG Regulations, as authorized in § 171.22, provided the requirements in §§ 171.22 and 171.23, as applicable, and this section are met. In addition, a cylinder, pressure drum, MEGC, cargo tank motor vehicle, portable tank or rail tank car authorized by the Transport Canada TDG Regulations may be used for transportation to, from, or within

the United States provided the cylinder, pressure drum, MEGC, cargo tank motor vehicle, portable tank, or rail tank car conforms to the applicable requirements of this section. Except as otherwise provided in this subpart and subpart C of this part, the requirements in parts 172, 173, and 178 of this subchapter do not apply for a material transported in accordance with the Transport Canada TDG Regulations.

* * * * *

5. In § 171.23, revise paragraph (a)(3) introductory text to read as follows:

§ 171.23 Requirements for specific materials and packagings transported under the ICAO Technical Instructions, IMDG Code, Transport Canada TDG Regulations, or the IAEA Regulations.

* * * * *

(a) * * *

(3) *Pi-marked pressure receptacles.* Pressure receptacles that are marked with a pi mark in accordance with the European Directive 2010/35/EU (IBR, *see* § 171.7) on transportable pressure equipment (TPED) and that comply with the requirements of Packing Instruction P200 or P208 and 6.2 of the ADR (IBR, *see* § 171.7) concerning pressure relief device use, test period, filling ratios, test pressure, maximum working pressure, and material compatibility for the lading contained or gas being filled, are authorized as follows:

* * * * *

PART 172—HAZARDOUS MATERIALS TABLE, SPECIAL PROVISIONS, HAZARDOUS MATERIALS COMMUNICATIONS, EMERGENCY RESPONSE INFORMATION, TRAINING REQUIREMENTS, AND SECURITY PLANS

6. The authority citation for part 172 continues to read as follows:

Authority: 49 U.S.C. 5101–5128, 44701; 49 CFR 1.81, 1.96 and 1.97.

7. In § 172.101, The Hazardous Materials Table is amended by removing the entries under “[REMOVE],” by adding in alphabetical order the entries under “[ADD,]” and by revising entries under “[REVISE]” in the appropriate alphabetical sequence.

The additions and revisions read as follows:

§ 172.101 Purpose and use of the hazardous materials table.

* * * * *

	2-Dimethylaminoethyl methacrylate, stabilized	6.1	UN2522	II	6.1	387, IB2, T7, TP2	153	202	243	5 L	60 L	B	40
	*		*		*		*		*		*		*
	<i>Fuel system components (including fuel control units (FCU), carburetors, fuel lines, fuel pumps) see Dangerous Goods in Apparatus or Dangerous Goods in Articles or Dangerous Goods in Machinery</i>												
	Medical waste, category A, affecting humans, <i>solid or</i> Medical waste, category A, affecting animals <i>only, solid</i>	6.2	UN3549		6.2	131, 430							
	Regulated medical waste, n.o.s. <i>or</i> Clinical waste, unspecified, n.o.s. <i>or</i> (BIO) Medical waste, n.o.s. <i>or</i> Biomedical waste, n.o.s., <i>or</i> Medical Waste n.o.s.	6.2	UN3291		6.2	41, 337, A13	134	197	197	No limit	No limit	B	40
	*		*		*		*		*		*		*
	[REVISE]												
	*		*		*		*		*		*		*
	Aerosols, <i>corrosive, Packing Group II or III, (each not exceeding 1 L capacity)</i>	2.2	UN1950		2.2, 8	A34	306	None	None	75 kg	150 kg	A	25, 87, 126, 157
	Aerosols, <i>flammable, (each not exceeding 1 L capacity)</i>	2.1	UN1950		2.1	N82	306	None	None	75 kg	150 kg	A	25, 87, 126, 157
	Aerosols, flammable, n.o.s. (<i>engine starting fluid</i>) (<i>each not exceeding 1 L capacity</i>)	2.1	UN1950		2.1	N82	306	304	None	Forbidden	150 kg	A	25, 87, 126, 157
	Aerosols, <i>non-flammable, (each not exceeding 1 L capacity)</i>	2.2	UN1950		2.2		306	None	None	75 kg	150 kg	A	25, 87, 126, 157
	Aerosols, <i>poison, Packing Group III (each not exceeding 1 L capacity)</i>	2.2	UN1950		2.2, 6.1		306	None	None	Forbidden	Forbidden	A	25, 87, 126, 157
	*		*		*		*		*		*		*
G	Alcoholates solution, n.o.s., <i>in alcohol</i>	3	UN3274	II	3, 8	IB2	150	202	243	1 L	5 L	B	52
	*		*		*		*		*		*		*
G	Alkali metal alcoholates, self-heating, corrosive, n.o.s.	4.2	UN3206	II	4.2, 8	64, A7, IB5, IP2, T3, TP33, W31	None	212	242	15 kg	50 kg	B	52
				III	4.2, 8	64, A7, IB8, IP3, T1, TP33, W31	None	213	242	25 kg	100 kg	B	52

[illegible]

A, I, W	Fibers, vegetable, dry	4.1	UN3360	III	4.1		137	151	213	240	Forbidden	Forbidden	A	
	*		*		*			*		*		*		*
A, W	Fish meal, stabilized <i>or</i> Fish scrap, stabilized	9	UN2216	III		155, IB8, IP3, T1, TP33		155	218	218	100 kg	200 kg	B	25, 88, 122, 128
	*		*		*			*		*		*		*
	Gas cartridges, (<i>flammable</i>) without a release device, non-refillable	2.1	UN2037		2.1			306	304	None	1 kg	15 kg	B	40, 157
	*		*		*			*		*		*		*
G	Infectious substances, affecting animals <i>only</i>	6.2	UN2900		6.2		A82	134	196	None	50 mL or 50 g	4 L or 4 kg	E	13, 40, 95, 155
G	Infectious substances, affecting humans	6.2	UN2814		6.2		A82	134	196	None	50 mL or 50 g	4 L or 4 kg	E	13, 40, 95, 155
	*		*		*			*		*		*		*
	Lithium ion batteries <i>including lithium ion polymer batteries</i>	9	UN3480		9		388, 422, A54, A100	185	185	185	Forbidden	35 kg	A	156
	Lithium ion batteries contained in equipment <i>including lithium ion polymer batteries</i>	9	UN3481		9		181, 360, 388, 422, A54	185	185	185	5 kg	35 kg	A	156
	Lithium ion batteries packed with equipment <i>including lithium ion polymer batteries</i>	9	UN3481		9		181, 360, 388, 422, A54	185	185	185	5 kg	35 kg	A	156
	Lithium metal batteries <i>including lithium alloy batteries</i>	9	UN3090		9		388, 422, A54	185	185	185	Forbidden	35 kg	A	156
	Lithium metal batteries contained in equipment <i>including lithium alloy batteries</i>	9	UN3091		9		181, 360, 388, 422, A54, A101	185	185	185	5 kg	35 kg	A	156
	Lithium metal batteries packed with equipment <i>including lithium alloy batteries</i>	9	UN3091		9		181, 360, 388, 422, A54	185	185	185	5 kg	35 kg	A	156
	*		*		*			*		*		*		*
	Nitrocellulose, <i>dry or wetted with less than 25 percent water (or alcohol), by mass</i>	1.1D	UN0340		1.1D		196	None	62	None	Forbidden	Forbidden	04	25, 27E
	Nitrocellulose, <i>with not more than 12.6 percent nitrogen, by dry mass mixture with or without plasticizer, with or without pigment</i>	4.1	UN2557	II	4.1		44, 197, W31	151	212	None	1 kg	15 kg	D	28, 36
	*		*		*			*		*		*		*

	Nitrocellulose, plasticized with not less than 18 percent plasticizing substance, by mass	1.3C	UN0343		1.3C	196	None	62	None	Forbidden	Forbidden	04	25
	*		*		*		*		*		*		*
	Nitrocellulose, unmodified or plasticized with less than 18 percent plasticizing substance, by mass	1.1D	UN0341		1.1D	196	None	62	None	Forbidden	Forbidden	04	25, 27E
	Nitrocellulose, wetted with not less than 25 percent alcohol, by mass	1.3C	UN0342		1.3C	196	None	62	None	Forbidden	Forbidden	04	25
	Nitrocellulose with alcohol with not less than 25 percent alcohol by mass, and with not more than 12.6 percent nitrogen, by dry mass	4.1	UN2556	II	4.1	197, W31	151	212	None	1 kg	15 kg	D	12, 25, 28, 36
	Nitrocellulose with water with not less than 25 percent water, by mass	4.1	UN2555	II	4.1	197, W31	151	212	None	15 kg	50 kg	E	28, 36
	*		*		*		*		*		*		*
	Receptacles, small, containing gas or gas cartridges (flammable) without release device, not refillable and not exceeding 1 L capacity	2.1	UN2037		2.1		306	304	None	1 kg	15 kg	B	40, 157
	Receptacles, small, containing gas or gas cartridges (non-flammable) without release device, not refillable and not exceeding 1 L capacity	2.2	UN2037		2.2		306	304	None	1 kg	15 kg	B	40, 157
	Receptacles, small, containing gas or gas cartridges (oxidizing), without release device, not refillable and not exceeding 1 L capacity	2.2	UN2037		2.2, 5.1	, A14	306	304	None	1 kg	15 kg	B	40, 157
	*		*		*		*		*		*		*
	Sodium methylate	4.2	UN1431	II	4.2, 8	A7, A19, IB5, IP2, T3, TP33, W31	None	212	242	15 kg	50 kg	B	52
	Sodium methylate solutions in alcohol	3	UN1289	II	3, 8	IB2, T7, TP1, TP8	150	202	243	1 L	5 L	B	52
				III	3, 8	B1, IB3, T4, TP1	150	203	242	5 L	60 L	A	52
	*		*		*		*		*		*		*
G	Water-reactive liquid, corrosive, n.o.s.	4.3	UN3129	I	4.3, 8	T14, TP2, TP7, TP13	None	201	243	Forbidden	1 L	D	13,148

[illegible]

* * * * *

8. In § 172.102:

a. In paragraph (c)(1):

i. Revise special provisions 47, 134, 135, 136, and 147;

ii. Add special provisions 196 and 197 in numerical order;

iii. Revise special provisions 360, 370, and 379d(1); and

iv. Add special provisions 430 and 441 in numerical order.

b. In paragraph (c)(8)(ii), remove and reserve TP codes TP39 and TP41.

The additions and revisions read as follows:

§ 172.102 Special provisions.

* * * * *

(c) * * *

(1) * * *

47 Mixtures of solids that are not subject to this subchapter and flammable liquids may be transported under this entry without first applying the classification criteria of Division 4.1, provided there is no free liquid visible at the time the material is loaded or at the time the packaging or transport unit is closed. Except when the liquids are fully absorbed in solid material contained in sealed bags, for single packagings, each packaging must correspond to a design type that has passed a leakproofness test at the Packing Group II level. Sealed packets and articles containing less than 10 mL of a Class 3 liquid in Packing Group II or III absorbed onto a solid material are not subject to this subchapter provided there is no free liquid in the packet or article.

* * * * *

134 This entry applies only to vehicles powered by wet batteries, sodium batteries, lithium metal batteries or lithium ion batteries, and equipment powered by wet batteries or sodium batteries that are transported with these batteries installed. Lithium batteries installed in a cargo transport unit, designed only to provide power external to the transport unit must use the proper shipping name “Lithium batteries installed in cargo transport unit” found in the § 172.101 Hazardous Materials Table.

a. For the purpose of this special provision, vehicles are self-propelled apparatus designed to carry one or more persons or goods. Examples of such vehicles are electrically-powered cars, motorcycles, scooters, three- and four-wheeled vehicles or motorcycles, trucks, locomotives, bicycles (pedal cycles with an electric motor) and other vehicles of this type (e.g., self-balancing vehicles or vehicles not equipped with at least one seating position), lawn tractors, self-propelled farming and construction equipment, boats, aircraft, wheelchairs and other mobility aids. This includes vehicles transported in a packaging. In this case, some parts of the vehicle may be detached from its frame to fit into the packaging.

b. Examples of equipment are lawnmowers, cleaning machines, or model boats and model aircraft. Equipment powered by lithium metal batteries or lithium ion batteries must be described using the entries “Lithium metal batteries contained in equipment” or “Lithium metal batteries packed with equipment” or “Lithium ion batteries contained in equipment” or “Lithium ion batteries packed with equipment,” as appropriate.

c. Self-propelled vehicles or equipment that also contain an internal combustion engine must be described using the entries “Engine, internal combustion, flammable gas powered” or “Engine, internal combustion, flammable liquid powered” or “Vehicle, flammable gas powered” or “Vehicle, flammable liquid powered,” as appropriate. These entries include hybrid electric vehicles powered by both an internal combustion engine

and batteries. Additionally, self-propelled vehicles or equipment that contain a fuel cell engine must be described using the entries “Engine, fuel cell, flammable gas powered” or “Engine, fuel cell, flammable liquid powered” or “Vehicle, fuel cell, flammable gas powered” or “Vehicle, fuel cell, flammable liquid powered,” as appropriate. These entries include hybrid electric vehicles powered by a fuel cell engine, an internal combustion engine, and batteries.

135 Internal combustion engines installed in a vehicle must be described using “Vehicle, flammable gas powered” or “Vehicle, flammable liquid powered,” as appropriate. If a vehicle is powered by a flammable liquid and a flammable gas internal combustion engine, it must be described using “Vehicle, flammable gas powered.” This includes hybrid electric vehicles powered by both an internal combustion engine and wet, sodium or lithium batteries installed. If a fuel cell engine is installed in a vehicle, the vehicle must be described using “Vehicle, fuel cell, flammable gas powered” or “Vehicle, fuel cell, flammable liquid powered,” as appropriate. This includes hybrid electric vehicles powered by a fuel cell, an internal combustion engine, and wet, sodium or lithium batteries installed. For the purpose of this special provision, vehicles are self-propelled apparatus designed to carry one or more persons or goods. Examples of such vehicles are cars, motorcycles, trucks, locomotives, scooters, three- and four-wheeled vehicles or motorcycles, lawn tractors, self-propelled farming and construction equipment, boats, and aircraft. Furthermore, lithium batteries installed in a cargo transport unit, designed only to provide power external to the transport unit must be described using the proper shipping name “Lithium batteries installed in cargo transport unit” found in the § 172.101 Hazardous Materials Table.

136 This entry applies only to articles, machinery, and apparatus containing hazardous materials as an integral element of the article, machinery, or apparatus. It may not be used to describe articles, machinery, or apparatus for which a proper shipping

name exists in the § 172.101 Table. Except when approved by the Associate Administrator, these items may only contain hazardous materials for which exceptions are referenced in Column (8) of the § 172.101 Table and are provided in part 173, subparts D and G, of this subchapter. Hazardous materials shipped under this entry are excepted from the labeling requirements of this subchapter unless offered for transportation or transported by aircraft and are not subject to the placarding requirements of subpart F of this part. Orientation markings as described in § 172.312(a)(2) are required when liquid hazardous materials may escape due to incorrect orientation. The article, machinery, or apparatus, if unpackaged, or the packaging in which it is contained shall be marked “Dangerous goods in articles” or “Dangerous goods in machinery” or “Dangerous goods in apparatus” as appropriate, with the identification number UN3363. For transportation by aircraft, articles, machinery, or apparatus, may not contain any material forbidden for transportation by passenger or cargo aircraft. The Associate Administrator may except from the requirements of this subchapter articles, machinery, and apparatus provided:

- a. It is shown that it does not pose a significant risk in transportation;
- b. The quantities of hazardous materials do not exceed those specified in § 173.4a of this subchapter; and
- c. The equipment, and machinery or apparatus articles conforms with § 173.222 of this subchapter.

* * * * *

147 This entry applies to non-sensitized emulsions, suspensions, and gels consisting primarily of a mixture of ammonium nitrate and fuel, intended to produce a Type E blasting explosive only after further processing prior to use. The mixture for emulsions typically has the following composition: 60-85% ammonium nitrate; 5-30% water; 2-8% fuel; 0.5-4% emulsifier or thickening agent; 0-10% soluble flame

suppressants; and trace additives. Other inorganic nitrate salts may replace part of the ammonium nitrate. The mixture for suspensions and gels typically has the following composition: 60-85% ammonium nitrate; 0-5% sodium or potassium perchlorate; 0-17% hexamine nitrate or monomethylamine nitrate; 5-30% water; 2-15% fuel; 0.5-4% thickening agent; 0-10% soluble flame suppressants; and trace additives. Other inorganic nitrate salts may replace part of the ammonium nitrate. These substances must satisfy the criteria for classification as an ammonium nitrate emulsion of Test Series 8 of the UN Manual of Tests and Criteria, Part I, Section 18 (IBR, *see* § 171.7 of this subchapter), and may not be classified and transported unless approved by the Associate Administrator.

* * * * *

196 The nitrocellulose must meet the criteria of the Bergmann-Junk test or methyl violet paper test in the UN Manual of Tests and Criteria, Appendix 10 (IBR, *see* § 171.7 of this subchapter). Test of type 3(c) is not required.

197 The nitrocellulose must meet the criteria of the Bergmann-Junk test or methyl violet paper test in the UN Manual of Tests and Criteria, Appendix 10 (IBR, *see* § 171.7 of this subchapter).

* * * * *

360 Vehicles powered only by lithium batteries must be described using “UN3171, Battery-powered vehicle.” Lithium batteries installed in a cargo transport unit, designed only to provide power external to the transport unit, must be described using “UN3536, Lithium batteries installed in a cargo transport unit.”

* * * * *

370 This entry also applies to ammonium nitrate with not more than 0.2% combustible substances, including any organic substance calculated as carbon, to the exclusion of any added substance, that gives a positive result when tested in accordance with Test Series 2 of the UN Manual of Tests and Criteria, Part I (IBR; *see* § 171.7 of this

subchapter). *See also* UN1942 in the § 172.101 Hazardous Materials Table. This entry may not be used for ammonium nitrate for which a proper shipping name already exists in the § 172.101 Hazardous Materials Table, including ammonium nitrate mixed with fuel oil or any other commercial grade of ammonium nitrate (e.g., ammonium nitrate fertilizer).

*	*	*	*	*
	379	*	*	*
	d.	*	*	*

(1) Receptacles shall be made of a material compatible with ammonia as specified in ISO 11114-1:2012(E) and ISO 11114-1:2012/Amd 1:2017(E) (IBR, *see* § 171.7 of this subchapter);

*	*	*	*	*
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430 This entry shall only be used for solid medical waste of Category A transported for disposal.

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441 For marine pollutants transported under “UN3077, Environmentally hazardous substance, solid, n.o.s.” or “UN3082, Environmentally hazardous substance, liquid, n.o.s.” and for purposes of shipping paper and package marking requirements, the technical name used in association with the basic description may be a proper shipping name listed in the § 172.101 Hazardous Material Table; provided that the name chosen is not also an entry that includes “n.o.s.” as a part of the name or one that has a “G” in column (1) of the table.

*	*	*	*	*
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9. In § 172.203, revise the first sentence of paragraph (i)(2), add paragraph (i)(4), revise paragraph (l)(1), and add paragraph (q) to read as follows:

§ 172.203 Additional description requirements.

* * * *

(i) * *

(2) A minimum flashpoint, if 60 °C (140 °F) or below (in °C closed cup (c.c.)), in association with the basic description, for Class 3 flammable liquid materials (as a primary or subsidiary hazard). * *

* * *

(4) For lithium cells or batteries transported in accordance with § 173.185(f), “DAMAGED/DEFECTIVE”; and for lithium cells or batteries transported for purposes of disposal or recycling, “LITHIUM BATTERIES FOR DISPOSAL” or “LITHIUM BATTERIES FOR RECYCLING”, as appropriate.

* * *

(l) * *

(1) For a proper shipping name used to describe a hazardous material that is a marine pollutant, either assigned the letter “G” in column (1) of the § 172.101 hazardous materials table, or that contains the text “n.o.s.”, the name of the component that makes the material a marine pollutant must appear in parentheses in association with the basic description. Where two or more components that make the material a marine pollutant are present, the names of at least two of the components most predominantly contributing to the marine pollutant designation must appear in parentheses in association with the basic description. For material described using “UN3077, Environmentally hazardous substance, solid, n.o.s.” and “UN3082, Environmentally hazardous substance, liquid, n.o.s.,” *see* § 172.102(c)(1), special provision 441 for additional provisions.

* * *

(q) *Holding time.* The date at which the actual holding time ends, as calculated in accordance with § 178.338-9, must be provided on the shipping paper in association with the basic description for refrigerated liquefied gases transported in a portable tank.

10. In § 172.301, revise paragraph (a)(1) introductory text to read as follows:

§ 172.301 General marking requirements for non-bulk packagings.

(a) * * *

(1) Except as otherwise provided by this subchapter, each person who offers a hazardous material for transportation in a non-bulk packaging must mark the package with the proper shipping name and identification number (preceded by “UN”, “NA” or “ID,” as appropriate), as shown in the §172.101 Hazardous Materials Table. The identification number marking preceded by “UN”, “NA”, or “ID” as appropriate must be marked in characters at least 12 mm (0.47 inches) high. Packages with a maximum capacity of 30 liters (8 gallons) or less, 30 kg (66 pounds) maximum net mass, or cylinders with a water capacity of 60 liters (16 gallons) or less must be marked with characters at least 6 mm (0.24 inches) high. Packages with a maximum capacity of 5 liters (1.32 gallons) or less or 5 kg maximum net mass (11 pounds) or less must be marked in a size appropriate for the size of the package.

* * * * *

11. In § 172.315, add paragraph (b)(3) to read as follows:

§ 172.315 Limited quantities.

* * * * *

(b) * * *

(3) For transportation by aircraft, the entire mark must appear on one side of the package.

* * * * *

12. In § 172.322, revise paragraph (a)(1) to read as follows:

§ 172.322 Marine pollutants.

(a) * * *

(1) For a proper shipping name used to describe a hazardous material that is a marine pollutant and assigned the letter “G” in column (1) of the § 172.101 hazardous materials table or that contains the text “n.o.s.,” the name of the component which makes the material a marine pollutant must be marked on the package in parentheses in association with the marked proper shipping name unless the proper shipping name identifies by name the component which makes the material a marine pollutant. Where two or more components that make a material a marine pollutant are present, the names of at least two of the components most predominantly contributing to the marine pollutant designation must appear in parentheses in association with the marked proper shipping name. For materials described using “UN3077, Environmentally hazardous substance, solid, n.o.s.” and “UN3082, Environmentally hazardous substance, liquid, n.o.s.,” *see* § 172.102(c)(1), special provision 441 for additional provisions; and

* * * * *

13. In § 172.406, revise paragraph (a) to read as follows:

§ 172.406 Placement of labels.

(a) *General.* (1) Except as provided in paragraphs (b) and (e) of this section, each label required by this subpart must—

(i) Be printed on or affixed to a surface (other than the bottom) of the package or containment device containing the hazardous material;

(ii) Be located on the same surface of the package and near the proper shipping

name marking, if the package dimensions are adequate; and

(iii) For transportation by aircraft, the entire label(s) must appear on one side of the package. For cylindrical packages, the label must be of such dimensions that it will not overlap itself. In the case of cylindrical packages containing radioactive materials, which require two identical labels, these labels must be centered on opposite points of the circumference and must not overlap each other. If the dimensions of the package are such that two identical labels cannot be affixed without overlapping each other, one label is acceptable provided it does not overlap itself.

(2) Except as provided in paragraph (e) of this section, duplicate labeling is not required on a package or containment device (such as to satisfy redundant labeling requirements).

* * * * *

§ 172.447 [Amended]

14. In § 172.447, remove paragraph (c).

PART 173—SHIPPERS--GENERAL REQUIREMENTS FOR SHIPMENTS AND PACKAGINGS

15. The authority citation for part 173 continues to read as follows:

Authority: 49 U.S.C. 5101–5128, 44701; 49 CFR 1.81, 1.96 and 1.97.

16. In § 173.4a, redesignate paragraph (g)(3) as paragraph (g)(4) and add new paragraph (g)(3) to read as follows:

§ 173.4a Excepted quantities.

* * * * *

(g) * * *

(3) For transportation by aircraft, the entire mark must appear on one side of the

package.

* * * * *

17. Add § 173.14 to subpart A to read as follows:

§ 173.14 Hazardous materials in equipment in use or intended for use during transport.

(a) Except for transportation by aircraft, hazardous materials (e.g., lithium batteries, fuel cell cartridges) contained in equipment, such as data loggers and cargo tracking devices, attached to or placed in packages, overpacks, or containers are not subject to this subchapter other than the following:

(1) The equipment must be in use or intended for use during transportation;

(2) The hazardous materials (e.g., lithium batteries, fuel cell cartridges) must meet the applicable construction and test requirements specified in this subchapter;

(3) The equipment must be capable of withstanding the shocks and loadings normally encountered during transport and must be safe for use in the environments to which it may be exposed; and

(4) When offered for transport by vessel, the requirements in § 176.76(a)(9) of this subchapter apply.

(b) For transportation by aircraft, lithium batteries contained in equipment such as data loggers and cargo tracking devices, attached to or placed in packages containing COVID-19 pharmaceuticals, are not subject to the marking and documentation requirements of § 173.185(c)(3) and (c)(4)(iv). This same package, when shipped without the COVID-19 pharmaceuticals for the purpose of use or reuse, is also not subject to the marking and documentation requirements of § 173.185(c)(3) and (c)(4)(iv), as applicable, provided prior arrangements have been made with the operator.

(c) The exception provided by this section does not apply to hazardous materials shipped as cargo. Hazardous materials contained in equipment as described in this section, when transported as a cargo, are subject to, and must be transported in accordance with, all applicable requirements of this subchapter.

18. In § 173.27, revise paragraph (c)(2), add paragraph (f) introductory text, and revise paragraph (f)(1), tables 1 and 2 to paragraph (f), and the heading to table 3 to paragraph (f) to read as follows:

§ 173.27 General requirements for transportation by aircraft.

* * * * *

(c) * * *

(2) Except for packagings used for material transported as “UN3082, Environmentally hazardous substance, liquid, n.o.s.,” packagings for which retention of liquid is a basic function must be capable of withstanding without leakage the greater of—

* * * * *

(f) *Combination packagings.* Unless otherwise specified in this part, or in Subpart C of part 171 of this subchapter, when combination packagings are intended for transportation aboard an aircraft, inner packagings must conform to the quantity limitations set forth in Table 1 of this paragraph for transport aboard passenger-carrying aircraft and Table 2 of this paragraph for transport aboard cargo-only aircraft. For materials that are authorized to exceed 220 L (58 gallons) or 200 kg (441 pounds) in accordance with columns (9A) and (9B) of the § 172.101 Hazardous Materials Table, there is no limitation on the maximum authorized net capacity of each inner packaging.

(1) *Excepted quantities.* For authorized materials and inner and outer package quantity limits for combination packages of excepted quantities intended for transportation by aircraft, *see* § 173.4a of this part.

* * * *

(3) * *

Table 1 to Paragraph (f)— Maximum Net Capacity of Inner Packaging for Transportation on Passenger-Carrying Aircraft

Maximum net quantity per package from Column 9a of the §172.101 table	Maximum authorized net capacity of <i>each inner packaging</i>	
	Glass, earthenware or fiber inner packagings	Metal or plastic inner packagings
Liquids:		
Not greater than 0.5 L	0.5 L	0.5 L
Greater than 0.5 L, not greater than 1 L	0.5 L	1 L
Greater than 1 L, not greater than 5 L	1 L	5 L
Greater than 5 L, not greater than 60 L	2.5 L	10 L
Greater than 60 L, not greater than 220 L	5 L	25 L
Class 9: UN1941, UN1990, UN2315, UN3082, UN3151, UN3334	10 L	Plastic: 30 L Metal: 40 L
Solids:		
Not greater than 5 kg	0.5 kg	1 kg
Greater than 5 kg. not greater than 25 kg	1 kg	2.5 kg
Greater than 25 kg, not greater than 200 kg	5 kg	10 kg
Class 9: UN1841, UN1931, UN2071, UN2216, UN2590, UN2969, UN3077, UN3152, UN3335, UN3432	Glass or earthenware: 10 kg Fiber: 50 kg	50 kg

Table 2 to Paragraph (f)—Maximum Net Capacity of Inner Packaging for Transportation on Cargo Aircraft

Maximum net quantity per package from Column 9b of the §172.101 table	Maximum authorized net capacity of <i>each inner packaging</i>	
	Glass, earthenware or fiber inner packagings	Metal or plastic inner packagings
Liquids:		
Not greater than 2.5L	1 L	1 L
Greater than 2.5L, not greater than 30L	2.5 L	2.5 L
Greater than 30L, not greater than 60L	5 L	10 L
Greater than 60L, not greater than 220L	5 L	25 L
Class 9: UN1941, UN1990, UN2315, UN3082, UN3151, UN3334	10 L	Plastic: 30 L Metal: 40 L

Solids:		
Not greater than 15 kg	1 kg	1 kg
Greater than 15 kg. not greater than 50 kg	2.5 kg	5 kg
Greater than 50 kg, not greater than 200 kg	5 kg	10 kg
Class 9: UN1841, UN1931, UN2071, UN2216, UN2590, UN2969, UN3077, UN3152, UN3335, UN3432	Glass or earthenware: 10 kg Fiber: 50 kg	50 kg

Table 3 to Paragraph (f)—Maximum Net Quantity of Each Inner and Outer Packaging for Materials Authorized for Transportation as Limited Quantity by Aircraft

* * * * *

19. In § 173.59, revise the description for “Detonators” and add a description for “Detonators, electronic programmable for blasting” in alphabetical order to read as follows:

§ 173.59 Description of terms for explosives.

* * * * *

Detonators. Articles consisting of a small metal or plastic tube containing explosives such as lead azide, PETN, or combinations of explosives. They are designed to start a detonation train. They may be constructed to detonate instantaneously or may contain a delay element. They may contain no more than 10 g of total explosives weight, excluding ignition and delay charges, per unit. The term includes: detonators for ammunition; detonators for blasting (electric, electronic, and non-electric); and detonating relays without flexible detonating cord.

Detonators, electronic programmable for blasting. Detonators using electronic components, such as an integrated circuit and/or micro processing technology to provide communications, energy control and storage capability, timing delay information, and validated commands to send a firing signal to the initiating charge.

* * * * *

20. In § 173.115, revise paragraph (k) to read as follows:

§ 173.115 Class 2, Divisions 2.1, 2.2, and 2.3—Definitions.

* * * *

(k) For Division 2.2 gases, the oxidizing ability shall be determined by tests or by calculation in accordance with ISO 10156:2017(E) (IBR, *see* § 171.7 of this subchapter).

* * * *

21. In § 173.134, revise paragraphs (a)(1) and (5) to read as follows:

§ 173.134 Class 6, Division 6.2—Definitions and exceptions.

(a) * * *

(1) *Division 6.2 (Infectious substance)* means a material known or reasonably expected to contain a pathogen. A pathogen is a microorganism (including bacteria, viruses, parasites, and fungi) or other agent, such as a proteinaceous infectious particle (prion) that can cause disease in humans or animals. An infectious substance must be assigned the identification number UN2814, UN2900, UN3291, UN3373, or UN3549 as appropriate, and must be assigned to one of the following categories:

(i) *Category A:* An infectious substance in a form capable of causing permanent disability or life-threatening or fatal disease in otherwise healthy humans or animals when exposure to it occurs. An exposure occurs when an infectious substance is released outside of its protective packaging, resulting in physical contact with humans or animals. A Category A infectious substance must be assigned to identification number UN2814, UN2900, or UN3549, as appropriate. Assignment to UN2814, UN2900, or UN3549 must be based on the known medical history or symptoms of the source patient or animal, endemic local conditions, or professional judgment concerning the individual circumstances of the source human or animal.

(ii) *Category B*: An infectious substance that is not in a form generally capable of causing permanent disability or life-threatening or fatal disease in otherwise healthy humans or animals when exposure to it occurs. This includes Category B infectious substances transported for diagnostic or investigational purposes. A Category B infectious substance must be described as “Biological substance, Category B” and assigned identification number UN3373. This does not include regulated medical waste, which must be assigned identification number UN3291.

* * * * *

(5) *Regulated medical waste or clinical waste or (bio) medical waste* means a waste or reusable material derived from the medical treatment of an animal or human, which includes diagnosis and immunization, or from biomedical research, which includes the production and testing of biological products. Regulated medical waste or clinical waste or (bio) medical waste containing a Category A infectious substance must be classed as an infectious substance, and assigned to UN2814, UN2900, or UN3549, as appropriate.

* * * * *

22. In § 173.137, revise the introductory text to read as follows:

§ 173.137 Class 8—Assignment of packing group.

The packing group of a Class 8 material is indicated in Column 5 of the § 172.101 Table. When the § 172.101 Table provides more than one packing group for a Class 8 material, the packing group must be determined using data obtained from tests conducted in accordance with the OECD Guidelines for the Testing of Chemicals, Test No. 435, “*In Vitro* Membrane Barrier Test Method for Skin Corrosion” (IBR, *see* § 171.7 of this subchapter) or Test No. 404, “Acute Dermal Irritation/Corrosion” (IBR, *see* § 171.7 of this subchapter). A material that is determined not to be corrosive in accordance with

OECD Guideline for the Testing of Chemicals, Test No. 430, “*In Vitro* Skin Corrosion: Transcutaneous Electrical Resistance Test (TER)” (IBR, *see* § 171.7 of this subchapter) or Test No. 431, “*In Vitro* Skin Corrosion: Reconstructed Human Epidermis (RHE) Test Method” (IBR, *see* § 171.7 of this subchapter) may be considered not to be corrosive to human skin for the purposes of this subchapter without further testing. However, a material determined to be corrosive in accordance with Test No. 430 must be further tested using Test No. 435 or Test No. 404. If the in vitro test results indicate that the substance or mixture is corrosive, but the test method does not clearly distinguish between assignment of packing groups II and III, the material may be considered to be in packing group II without further testing. The packing group assignment using data obtained from tests conducted in accordance with OECD Guideline Test No. 404 or Test No. 435 must be as follows:

* * * * *

23. In § 173.172, revise paragraphs (a) and (b) to read as follows:

§ 173.172 Aircraft hydraulic power unit fuel tank.

* * * * *

(a) The unit must consist of an aluminum pressure vessel made from tubing and having welded heads. Primary containment of the fuel within this vessel must consist of a welded aluminum bladder having a maximum internal volume of 46 L (12 gallons). The outer vessel must have a minimum design gauge pressure of 1,275 kPa (185 psig) and a minimum burst gauge pressure of 2,755 kPa (400 psig). Each vessel must be leak-checked during manufacture and before shipment and must be found leakproof. The complete inner unit must be securely packed in non-combustible cushioning material, such as vermiculite, in a strong outer tightly closed metal packaging which will

adequately protect all fittings. Maximum quantity of fuel per primary containment and package is 42 L (11 gallons); or

(b) The unit must consist of an aluminum pressure vessel. Primary containment of the fuel within this vessel must consist of a welded hermetically sealed fuel compartment with an elastomeric bladder having a maximum internal volume of 46 L (12 gallons). The pressure vessel must have a minimum design gauge pressure of 5,170 kPa (750 psig). Each vessel must be leak-checked during manufacture and before shipment and must be found leakproof, and must be securely packed in non-combustible cushioning material, such as vermiculite, in a strong outer tightly closed metal packaging which will adequately protect all fittings. Maximum quantity of fuel per primary containment and package is 42 L (11 gallons).

24. In § 173.181, revise paragraph (b) to read as follows:

§ 173.181 Pyrophoric materials (liquids).

* * * * *

(b) Steel boxes (4A), aluminum boxes (4B), metal boxes, other than steel or aluminum (4N), wooden boxes (4C1, 4C2, 4D, or 4F) or fiberboard boxes (4G); steel drums (1A1 or 1A2), aluminum drums (1B1 or 1B2), metal drums, other than steel or aluminum (1N1 or 1N2), plywood drums (1D), or fiber drums (1G); or steel jerricans (3A1 or 3A2) or aluminum jerricans (3B1 or 3B2) enclosing not more than four strong, tight metal cans with inner receptacles of glass or metal, not over 1 L (0.3 gallon) capacity each, having positive screwcap closures adequately gasketed or alternative closures physically held in place by a means capable of preventing back-off or loosening of the closure due to conditions normally incident to transportation (e.g., impact, vibration, etc.). Inner packagings must be cushioned on all sides with dry, absorbent, incombustible material in a quantity sufficient to absorb the entire contents.

* * * *

25. In § 173.185, revise paragraphs (c)(3)(i) introductory text and (c)(3)(i)(A) to read as follows:

§ 173.185 Lithium cell and batteries.

* * * *

(c) * *

(3) * *

(i) The mark must indicate the UN number: “UN3090” for lithium metal cells or batteries; or “UN3480” for lithium ion cells or batteries. Where the lithium cells or batteries are contained in, or packed with, equipment, the UN number “UN3091” or “UN3481,” as appropriate, must be indicated. Where a package contains lithium cells or batteries assigned to different UN numbers, all applicable UN numbers must be indicated on one or more marks. The package must be of such size that there is adequate space to affix the mark on one side without the mark being folded.

Figure 1 to paragraph (c)(3)(i) introductory text



(A) The mark must be in the form of a rectangle or a square with hatched edging. The mark must be not less than 100 mm (3.9 inches) wide by 100 mm (3.9 inches) high and the minimum width of the hatching must be 5 mm (0.2 inches), except marks of 100 mm (3.9 inches) wide by 70 mm (2.8 inches) high may be used on a package containing lithium batteries when the package is too small for the larger mark;

* * * * *

26. In § 173.187, revise paragraphs (b), (c), (e), and (f) to read as follows:

§ 173.187 Pyrophoric solids, metals or alloys, n.o.s.

* * * * *

(b) In wooden boxes (4C1, 4C2, 4D, or 4F) with inner metal receptacles that have threaded closures or alternate closures physically held in place by a means capable of preventing back-off or loosening of the closure due to conditions normally incident to transportation (e.g., impact, vibration, etc.). Each inner metal receptacle must not contain more than 15 kg (33 pounds).

(c) In fiberboard boxes (4G) with inner metal receptacles that have threaded closures or alternate closures physically held in place by a means capable of preventing back-off or loosening of the closure due to conditions normally incident to transportation (e.g., impact, vibration, etc.). Each inner metal receptacle must not contain more than 7.5 kg (17 pounds).

* * * * *

(e) In plywood drums (1D) with inner metal receptacles that have threaded closures or alternate closures physically held in place by a means capable of preventing back-off or loosening of the closure due to conditions normally incident to transportation (e.g., impact, vibration, etc.). Each inner metal receptacle must not contain more than 15 kg (33 pounds).

(f) In fiberboard drums (1G) with inner metal receptacles that have threaded closures or alternate closures physically held in place by a means capable of preventing back-off or loosening of the closure due to conditions normally incident to transportation (e.g., impact, vibration, etc.) Each inner metal receptacle must not contain more than 15 kg (33 pounds).

* * * * *

27. In § 173.199, revise the paragraph (a)(5) introductory text preceding the image of the UN3373 mark to read as follows:

§ 173.199 Category B infectious substances.

(a) * * *

(5) The following square-on-point mark must be displayed on the outer packaging on a background of contrasting color. The width of the line forming the border must be at least 2 mm (0.08 inches) and the letters and numbers must be at least 6 mm (0.24 inches) high. The size of the mark must be such that no side of the diamond is less than 50 mm (1.97 inches) in length as measured from the outside of the lines forming the border. For transportation by aircraft, the entire mark must appear on one side of the package. The proper shipping name “Biological substances, Category B” must be marked on the outer packaging adjacent to the diamond-shaped mark in letters that are at least 6 mm (0.24 inches) high.

* * * * *

28. Revise § 173.218 to read as follows:

§ 173.218 Fish meal or fish scrap.

(a) *Transportation by vessel.* (1) Except as provided in Column (7) of the HMT in § 172.101 of this subchapter, fish meal or fish scrap, containing at least 6%, but not more than 12% water, is authorized for transportation in packagings as follows:

- (i) Burlap (jute) bag;
- (ii) Multi-wall paper bag;
- (iii) Polyethylene-lined burlap or paper bag;
- (iv) Cargo tank;
- (v) Portable tank;
- (vi) Rail car; or
- (vii) Freight container.

(2) The fish meal or fish scrap must contain at least 50 ppm (mg/kg) of ethoxyquin, 100 ppm (mg/kg) of butylated hydroxytoluene (BHT), or 250 ppm (mg/kg) of tocopherol-based antioxidant at the time of shipment. Stabilization of fish meal or fish scrap must occur at the time of production and the application must be within twelve months prior to shipment.

(b) *Transportation by air.* (1) Except as provided in Column (7) of the HMT in § 172.101 of this subchapter, fish meal or fish scrap, containing at least 6%, but not more than 12% water, is authorized for transportation in packagings as follows:

- (i) The following combination packagings are authorized:

(A) *Outer packagings:* Steel drum: 1A1 or 1A2; Aluminum drum: 1B1 or 1B2; Metal drum other than steel or aluminum: 1N1 or 1N2; Fiber drum: 1G; Plastic drum: 1H1 or 1H2; Steel jerrican: 3A1 or 3A2; Plastic jerrican: 3H1 or 3H2; Aluminum jerrican: 3B1 or 3B2; Steel box: 4A; Aluminum box: 4B; Natural wood box: 4C1 or 4C2; Plywood box: 4D; Reconstituted wood box: 4F; Fiberboard box: 4G; Solid plastic box: 4H2; or Metal box other than steel or aluminum: 4N.

(B) *Inner packagings:* Glass, Fiber, Metal, or Plastic.

(ii) The following single packagings are authorized:

(A) Steel drum: 1A1 or 1A2; Aluminum drum: 1B1 or 1B2; Plywood drum with liner: 1D; Plastic drum: 1H1 or 1H2; Fiber drum with liner: 1G; Metal drum other than steel or aluminum: 1N1 or 1N2; Steel jerrican: 3A1 or 3A2; Plastic jerrican: 3H1 or 3H2; Aluminum jerrican: 3B1 or 3B2; Steel box: 4A; Aluminum box: 4B; Metal box other than steel or aluminum: 4N; Natural wood box with liner: 4C2; Plywood box with liner: 4D; Reconstituted wood box with liner: 4F; Fiberboard box with liner: 4G; Solid plastic box: 4H2; Bag, woven plastic: 5H3; Bag, plastic film: 5H4; Bag, textile: 5L3; Bag, paper, multiwall, water resistant: 5M2; Plastic receptacle in steel, aluminum, plywood, fiber or plastic drum: 6HA1, 6HB1, 6HD1, 6HG1 or 6HH1; Plastic receptacle in steel, aluminum, wood, plywood or fiberboard box: 6HA2, 6HB2, 6HC, 6HD2, 6HG2 or 6HH2; or Cylinders, as prescribed for any compressed gas, except for Specification 8 and 3HT.

(B) [Reserved]

(2) The fish meal or fish scrap must contain at least 50 ppm (mg/kg) of ethoxyquin, 100 ppm (mg/kg) of butylated hydroxytoluene (BHT), or 250 ppm (mg/kg) of tocopherol-based antioxidant at the time of shipment. Stabilization of fish meal or fish scrap must occur at the time of production and the application must be within twelve months prior to shipment.

29. In § 173.221, revise paragraph (a) to read as follows:

§ 173.221 Polymeric beads, expandable and Plastic molding compound.

(a) For non-bulk shipments of Polymeric beads (or granules), expandable *evolving flammable vapor* and Plastic molding compound *in dough, sheet, or extruded rope form, evolving flammable vapor* the following packagings are authorized:

(1) *Single packagings.* Metal box (4A, 4B, or 4N); Wooden box (4C1 or 4C2); Plywood box (4D); Fiberboard box (4G); Reconstituted wood box (4F); Plastic box (4H1

or 4H2); Plywood drums: (1D) or Fiber drums (1G) with sealed inner plastic liners; in vapor tight metal or plastic drums (1A1, 1A2, 1B1, 1B2, 1N1, 1N2, 1H1 or 1H2); or in vapor tight metal or plastic jerricans (3A1, 3A2, 3B1, 3B2, 3H1, or 3H2).

(2) *Combination packagings*—(i) *Outer packagings*: Steel drum: 1A1 or 1A2; Aluminum drum: 1B1 or 1B2; Plywood drum: 1D; Fiber drum: 1G; Plastic drum: 1H1 or 1H2; Metal drum other than steel or aluminum: 1N1 or 1N2; Steel jerrican: 3A1 or 3A2; Plastic jerrican: 3H1 or 3H2; Aluminum jerrican: 3B1 or 3B2; Steel box: 4A; Aluminum box: 4B; Natural wood box: 4C1 or 4C2; Plywood box: 4D; Reconstituted wood box: 4F; Fiberboard box: 4G; Plastic box: 4H1 or 4H2; or Metal box other than steel or aluminum: 4N.

(ii) *Inner packagings*. Glass receptacles, Plastic receptacles, Metal receptacles, Paper receptacles, or Fiber receptacles.

(3) *Non-specification packagings*. Non-specification packagings when transported in dedicated vehicles or freight containers. The packagings need not conform to the requirements for package testing in part 178 of this subchapter but must be capable of containing any evolving gases from the contents during normal conditions of transportation.

* * * * *

30. Revise § 173.222 to read as follows:

§ 173.222 Dangerous goods in articles, machinery, or apparatus.

Hazardous materials in articles, machinery, or apparatus are excepted from the specification packaging requirements of this subchapter when packaged according to this section. Hazardous materials in articles, machinery, or apparatus must be packaged in strong outer packagings, unless the receptacles containing the hazardous materials are afforded adequate protection by the construction of the article, machinery, or apparatus.

Each package must conform to the packaging requirements of subpart B of this part, except for the requirements in §§ 173.24(a)(1) and 173.27(e), and the following requirements:

(a) If the article, machinery, or apparatus contains more than one hazardous material, the materials must not be capable of reacting dangerously together.

(b) The nature of the containment must be as follows—

(1) Damage to the receptacles containing the hazardous materials during transport is unlikely. However, in the event of damage to the receptacles containing the hazardous materials, no leakage of the hazardous materials from the article, machinery, or apparatus is possible. A leakproof liner may be used to satisfy this requirement.

(2) Receptacles containing hazardous materials must be secured and cushioned so as to prevent their breakage or leakage and so as to control their shifting within the article, machinery, or apparatus during normal conditions of transportation. Cushioning material must not react dangerously with the content of the receptacles. Any leakage of the contents must not substantially impair the protective properties of the cushioning material.

(3) Receptacles for gases, their contents and filling densities must conform to the applicable requirements of this subchapter, unless otherwise approved by the Associate Administrator.

(c)(1) Except for transportation by aircraft, the total net quantity of hazardous materials contained in one item of an article, machinery, or apparatus must not exceed the following:

(i) In the case of solids or liquids, the limited quantity amount specified in the corresponding section referenced in Column (8A) of the § 172.101 Table;

(ii) 0.5 kg (1.1 pounds) in the case of Division 2.2 gases.

(iii) When an article, machinery, or apparatus contains multiple hazardous materials, the quantity of each hazardous material must not exceed the quantity specified in the corresponding section referenced in Column (8A) of the § 172.101 Table, or for gases, paragraph (c)(1)(ii) of this section.

(2) For transportation by aircraft, the total net quantity of hazardous materials contained in one item of an article, machinery, or apparatus must not exceed the following:

(i) 1 kg (2.2 pounds) in the case of solids;

(ii) 0.5 L (0.1 gallons) in the case of liquids;

(iii) 0.5 kg (1.1 pounds) in the case of Division 2.2 gases. Division 2.2 gases with subsidiary risks and refrigerated liquefied gases are not authorized;

(iv) A total quantity of not more than the aggregate of that permitted in paragraphs (c)(2)(i) through (iii) of this section, for each category of material in the package, when a package contains hazardous materials in two or more of the categories in paragraphs (c)(2)(i) through (iii) of this section; and

(d) Except for transportation by aircraft, when a package contains hazardous materials in two or more of the categories listed in paragraph (c)(1) of this section the total quantity required by § 172.202(c) of this subchapter to be entered on the shipping paper must be either the aggregate quantity, or the estimated quantity, of all hazardous materials, expressed as net mass.

31. In § 173.225:

a. In paragraph (c), revise the heading to the Organic Peroxide Table and revise the entry “Di-(4-tert-butylcyclohexyl) peroxydicarbonate [as a paste]”; and

b. In paragraph (e), revise the heading to the Organic Peroxide IBC Table, and in the UN3119 ORGANIC PEROXIDE, TYPE F, LIQUID, TEMPERATURE

CONTROLLED portion, add entries for “tert-Amyl peroxyphthalate, not more than 42% as a stable dispersion in water” and “tert-Butyl peroxyphthalate, not more than 42% in a diluent type A” in alphabetical order.

The revisions and additions read as follows:

§ 173.225 Packaging requirements and other provisions for organic peroxides.

* * * *

(c) * *

Table 1 to Paragraph (c): Organic Peroxide Table

Technical name	ID No.	Concentration (mass %)	Diluent (mass %)			Water (mass %)	Packing method	Temperature (°C)		Notes
			A	B	I			Control	Emergency	
(1)	(2)	(3)	(4a)	(4b)	(4c)	(5)	(6)	(7a)	(7b)	(8)
*		*		*		*		*		*
Di-(4-tert-butylcyclohexyl)peroxydicarbonate [as a paste]	UN3118	≤ 42					OP8	35	40	
*		*		*		*		*		*

* * * *

(e) * *

Table 3 to Paragraph (e): Organic Peroxide IBC Table

UN No.	Organic peroxide	Type of IBC	Maximum quantity (liters)	Control temperature	Emergency temperature
*	*	*	*	*	*
3119	ORGANIC PEROXIDE, TYPE F, LIQUID, TEMPERATURE CONTROLLED				
*	*	*	*	*	*

	tert-Amyl peroxy-pivalate, not more than 42% as a stable dispersion in water	31HA1	1000	0 °C	+10 °C
	tert-Butyl peroxy-pivalate, not more than 42% in a diluent type A	31HA1 31A	1000 1250	10 °C 10 °C	15°C 15°C
*	*	*	*	*	*

* * * * *

32. In § 173.301b, revise paragraphs (a)(2) and (c) to read as follows:

§ 173.301b Additional general requirements for shipment of UN pressure receptacles.

(a) * * *

(2) The gases or gas mixtures must be compatible with the UN pressure receptacle and valve materials as prescribed for metallic materials in ISO 11114-1:2012(E) and ISO 11114-1:2012/Amd 1:2017(E) (IBR, *see* § 171.7 of this subchapter) and for non-metallic materials in ISO 11114-2:2013(E) (IBR, *see* § 171.7 of this subchapter).

* * * * *

(c) *Pressure receptacle valve requirements.* (1) When the use of a valve is prescribed, the valve must conform to the requirements in ISO 10297:2014(E) and ISO 10297:2014/Amd 1:2017 (IBR, *see* § 171.7 of this subchapter). Quick release cylinder valves for specification and type testing must conform to the requirements in ISO 17871:2015(E) (IBR, *see* § 171.7 of this subchapter). Until December 31, 2022, the manufacture of a valve conforming to the requirements in ISO 10297:2014(E) is authorized. Until December 31, 2020, the manufacture of a valve conforming to the requirements in ISO 10297:2006(E) (IBR, *see* § 171.7 of this subchapter) was authorized. Until December 31, 2008, the manufacture of a valve conforming to the requirements in ISO 10297:1999(E) (IBR, *see* § 171.7 of this subchapter) was authorized.

(2) A UN pressure receptacle must have its valves protected from damage that could cause inadvertent release of the contents of the UN pressure receptacle by one of the following methods:

(i) By constructing the pressure receptacle so that the valves are recessed inside the neck of the UN pressure receptacle and protected by a threaded plug or cap;

(ii) By equipping the UN pressure receptacle with a valve cap conforming to the requirements in ISO 11117:2008(E) and Technical Corrigendum 1 (IBR, *see* § 171.7 of this subchapter). Until December 31, 2014, the manufacture of a valve cap conforming to the requirements in ISO 11117:1998(E) (IBR, *see* § 171.7 of this subchapter) was authorized. The cap must have vent-holes of sufficient cross-sectional area to evacuate the gas if leakage occurs at the valve;

(iii) By protecting the valves by shrouds or guards conforming to the requirements in ISO 11117:2008(E) and Technical Corrigendum 1 (IBR; *see* § 171.7 of this subchapter). Until December 31, 2014, the manufacture of a shroud or guard conforming to the requirements in ISO 11117:1998(E) (IBR, *see* § 171.7 of this subchapter) was authorized. For metal hydride storage systems, by protecting the valves in accordance with the requirements in ISO 16111:2008(E) (IBR; *see* § 171.7 of this subchapter).

(iv) By using valves designed and constructed with sufficient inherent strength to withstand damage in accordance with Annex B of ISO 10297:2014(E)/Amd. 1: 2017;

(v) By enclosing the UN pressure receptacles in frames (e.g., bundles of cylinders);

(vi) By packing the UN pressure receptacles in a strong outer package, such as a box or crate, capable of meeting the drop test specified in § 178.603 of this subchapter at the Packing Group I performance level; or

(vii) By using valves designed and constructed in accordance with Annex A of ISO 17879:2017(E) (IBR, *see* § 171.7 of this subchapter) for UN pressure receptacles with self-closing valves with inherent protection (except those in acetylene service).

* * * * *

33. In § 173.304b, revise paragraph (b)(2) to read as follows:

§ 173.304b Additional requirements for shipment of liquefied compressed gases in UN pressure receptacles.

* * * * *

(b) * * *

(2) For low pressure liquefied gases, the maximum mass in kilograms of contents per liter of water capacity must be less than or equal to 95 percent of the liquid phase at 50 °C. In addition, the UN pressure receptacle may not be liquid full at 60 °C. The test pressure of the pressure receptacle must be equal to or greater than the vapor pressure of the liquid at 65 °C.

* * * * *

34. In § 173.306, revise paragraphs (f)(2)(i) and (f)(3)(iv) and add paragraph (n) to read as follows:

§ 173.306 Limited quantities of compressed gases.

* * * * *

(f) * * *

(2) * * *

(i) Each accumulator must be shipped as an inside packaging. Robust accumulators may be transported unpackaged, in crates, or in appropriate overpacks,

when the hazardous materials are afforded equivalent protection by the article in which they are contained;

* * * * *

(3) * * *

(iv) Accumulators must be packaged in strong outer packaging. Robust accumulators may be transported unpackaged, in crates, or in appropriate overpacks, when the hazardous materials are afforded equivalent protection by the article in which they are contained.

* * * * *

(n) *Receptacles, small, containing gas or gas cartridges for recycling or disposal.*

Receptacles, small, containing gas *or* gas cartridges not exceeding 1.0 L (0.3 gallons) capacity may be offered for transportation for the purposes of recycling or disposal.

Receptacles, small, containing gas *or* gas cartridges are not required to be protected against shifting and inadvertent discharge if measures to prevent dangerous build-up of pressure and dangerous atmospheres are addressed and are excepted from the specification packaging requirements of this subchapter when packaged and offered in accordance with this paragraph (n).

(1) Receptacles, small, containing gas *or* gas cartridges for recycling or disposal, other than those that are leaking or severely deformed, must be packaged as follows:

(i) The receptacles, small, containing gas *or* gas cartridges must be packaged in a strong outer packaging. The strong outer packaging and its contents must not exceed a gross weight of 55 kg (121 pounds) for fiberboard packagings or 125 kg (275 pounds) for other packagings; and

(ii) Packagings must be adequately ventilated to prevent the creation of dangerous atmospheres and build-up of pressure.

(2) Rigid large packagings are authorized conforming to the packing group II performance level made of:

(i) Steel (50A); Aluminum (50B); Metal other than steel or aluminum (50N); Rigid plastics (50H); Natural wood (50C); Plywood (50D); Reconstituted wood (50F); Rigid fiberboard (50G).

(ii) Large packagings must be designed and constructed to prevent dangerous shifting and inadvertent discharge during normal conditions of transport;

(iii) Large packagings must be adequately ventilated to prevent the creation of dangerous atmospheres and the build-up of pressure; and

(iv) Leaking or severely deformed containers must be transported in salvage cylinders or salvage packagings provided adequate measures are taken to prevent a dangerous build-up of pressure.

(3) Receptacles, small, containing gas *or* gas cartridges for recycling or disposal must not be transported in closed freight containers.

(4) Receptacles, small, containing gas *or* gas cartridges for recycling or disposal that were filled with Division 2.2 gases and have been pierced are not subject to the requirements of this subchapter.

35. In § 173.335, revise paragraph (d) to read as follows:

§ 173.335 Chemical under pressure n.o.s.

* * * * *

(d) *Periodic inspection.* (1) Except as specified in (d)(2) of this section, the maximum requalification test period for cylinders transporting chemical under pressure n.o.s. is 5 years.

(2) For cylinders with maximum capacity of 450 L or less and filled with materials used as fire extinguishing agents, the maximum requalification test period is 10 years.

PART 175—CARRIAGE BY AIRCRAFT

36. The authority citation for part 175 continues to read as follows:

Authority: 49 U.S.C. 5101–5128, 44701; 49 CFR 1.81 and 1.97.

37. In § 175.8, add paragraph (b)(5) to read as follows:

§ 175.8 Exceptions for operator equipment and items of replacement.

* * * * *

(b) * * *

(5) Alcohol-based hand sanitizers and alcohol-based cleaning products that are accessible to crewmembers in the passenger cabin during the flight or series of flights for the purposes of passenger and crew hygiene. Conditions for the carriage and use must be described in an operations manual and/or other appropriate manuals.

38. In § 175.9, revise paragraph (b)(5)(ii) to read as follows:

§ 175.9 Special aircraft operations.

* * * * *

(b) * * *

(5) * * *

(ii) Each type of battery used is either nonspillable, lithium metal, or lithium ion. Lithium metal or lithium ion batteries must meet the provisions of § 173.185(a) of this subchapter. Spare batteries—of any type—must be individually protected to prevent short circuits when not in use;

* * * *

39. In § 175.10, revise paragraphs (a)(1) and (11) to read as follows:

§ 175.10 Exceptions for passengers, crewmembers, and air operators.

* * * *

(a) * *

(1)(i) Non-radioactive medicinal and toilet articles for personal use (including aerosols) carried in carry-on and checked baggage. Release devices on aerosols must be protected by a cap or other suitable means to prevent inadvertent release;

(ii) Other aerosols in Division 2.2 (nonflammable gas) with no subsidiary risk carried in carry-on or checked baggage. Release devices on aerosols must be protected by a cap or other suitable means to prevent inadvertent release;

(iii) The aggregate quantity of these hazardous materials carried by each person may not exceed 2 kg (70 ounces) by mass or 2 L (68 fluid ounces) by volume and the capacity of each container may not exceed 0.5 kg (18 ounces) by mass or 500 ml (17 fluid ounces) by volume; and

(iv) The release of gas must not cause extreme annoyance or discomfort to crew members so as to prevent the correct performance of assigned duties.

* * * *

(11) No more than two self-inflating personal safety devices, intended to be worn by a person such as a life jacket or vest, fitted with no more than two small gas cartridges per device (containing no hazardous material other than a Division 2.2 gas) for inflation purposes plus no more than two spare cartridges per device. The personal safety device(s) and spare cartridges may be carried in carry-on or checked baggage, with the approval of the aircraft operator, and must be packed in such a manner that they cannot be accidentally activated.

* * * * *

40. In § 175.75, revise paragraph (b) and Notes 1 and 2 to the Quantity and Loading Table in paragraph (f) to read as follows:

§ 175.75 Quantity limitations and cargo location.

* * * * *

(b) *Hazardous materials stowage.* (1) Except as otherwise provided in this subchapter, no person may carry a hazardous material in the cabin of a passenger-carrying aircraft or on the flight deck of any aircraft, and the hazardous material must be located in a place that is inaccessible to persons other than crew members.

(2) Hazardous materials may be carried in a main deck cargo compartment of a passenger aircraft provided that the compartment is inaccessible to passengers and that it meets all certification requirements for: a Class B aircraft cargo compartment in 14 CFR 25.857(b); or a Class C aircraft cargo compartment in 14 CFR 25.857(c).

(3) A package bearing a “KEEP AWAY FROM HEAT” handling marking must be protected from direct sunshine and stored in a cool and ventilated place, away from sources of heat.

(4) Except as provided in paragraph (f) of this section, a package containing a hazardous material acceptable for cargo-only aircraft must be loaded in an accessible manner.

* * * * *

(f) * * *

Note 1 to § 175.75(f): The following materials are not subject to this loading restriction—

a. Class 3, PG III (unless the substance is also labeled CORROSIVE).

b. Division 6.1 (unless the substance is also labeled for any hazard class or division except FLAMMABLE LIQUID).

c. Division 6.2.

d. Class 7 (unless the hazardous material meets the definition of another hazard class).

e. Class 9, Limited Quantity, or Excepted Quantity material.

f. Articles of Identification Numbers UN0012, UN0014, or UN0055 also meeting the requirements of § 173.63(b).

g. Articles of Identification Numbers UN3528 or UN3529.

Note 2 to § 175.75(f): Aboard cargo-only aircraft, packages required to be loaded in a position that is considered to be accessible include those loaded in a Class C cargo compartment.

PART 176—CARRIAGE BY VESSEL

41. The authority citation for part 176 continues to read as follows:

Authority: 49 U.S.C. 5101–5128; 49 CFR 1.81 and 1.97.

42. In § 176.84:

a. In the paragraph (b) table, revise code 4 and add codes 155, 156, and 157 in numerical order; and

b. In the paragraph (c)(2) table, revise provisions 19E and 22E.

The revisions read as follows:

§ 176.84 Other requirements for stowage, cargo handling, and segregation for cargo vessels and passenger vessels.

* * * * *

(b) * * *

Code	Provisions
* * * * *	* * * * *
4	Shall not be stowed together with combustible material in the same cargo transport unit.
* * * * *	* * * * *
155	Avoid handling the package or keep handling to a minimum. Inform the appropriate public health authority or veterinary authority where persons or animals may have been exposed.
156	For lithium batteries transported in accordance with § 173.185(f) or for purposes of disposal or recycling, stowage category C applies.
157	For aerosols and gas receptacles transported for purposes of recycling or disposal, stowage category C applies, and stowage must be clear of living quarters.
* * * * *	* * * * *

* * * * *

(c) * * *

(2) * * *

Notes	Provisions
* * * * *	* * * * *
19E	“Separated from” explosives containing chlorates or perchlorates.
* * * * *	* * * * *
22E	“Separated from” ammonium compounds and explosives containing ammonium compounds or salts.
* * * * *	* * * * *

* * * * *

PART 178—SPECIFICATIONS FOR PACKAGINGS

43. The authority citation for part 178 continues to read as follows:

Authority: 49 U.S.C. 5101–5128; 49 CFR 1.81 and 1.97.

44. In § 178.3, revise paragraph (a)(4) to read as follows:

§ 178.3 Marking of packagings.

(a) * * *

(4) Unless otherwise specified, letters and numerals must be at least 12.0 mm (0.47 inches) in height except for packagings of less than or equal to 30 L (7.9 gallons) capacity for liquids or 30 kg (66 pounds) maximum net mass for solids the height must be at least 6.0 mm (0.2 inches). For packagings having a capacity of 5 L (1.3 gallons) or less or of 5 kg (11 pounds) maximum net mass, letters and numerals must be of an appropriate size.

* * * * *

45. In § 178.71, revise paragraph (d)(2), add paragraph (l)(1)(iv), and revise paragraph (o)(1) to read as follows:

§ 178.71 Specifications for UN pressure receptacles.

* * * * *

(d) * * *

(2) Service equipment must be configured, or designed, to prevent damage that could result in the release of the pressure receptacle contents during normal conditions of handling and transport. Manifold piping leading to shut-off valves must be sufficiently flexible to protect the valves and the piping from shearing or releasing the pressure receptacle contents. The filling and discharge valves and any protective caps must be secured against unintended opening. The valves must conform to ISO 10297:2014(E) and ISO 10297:2014/Amd 1:2017(E) (IBR, *see* § 171.7 of this subchapter), or for non-refillable pressure receptacles valves manufactured until December 31, 2020, ISO 13340:2001(E), and be protected as specified in § 173.301b(f) of this subchapter. Until December 31, 2022, the manufacture of a valve conforming to the requirements of ISO 10297:2014(E) is authorized. Until December 31, 2020, the manufacture of a valve conforming to the requirements in ISO 10297:2006(E) (IBR, *see* § 171.7 of this subchapter) was authorized. Until December 31, 2008, the manufacture of a valve

conforming to the requirements in ISO 10297:1999(E) (IBR, *see* § 171.7 of this subchapter) was authorized. Additionally, valves must be initially inspected and tested in accordance with ISO 14246:2014(E) and ISO 14246:2014/Amd 1:2017(E), (IBR, *see* § 171.7 of this subchapter). For self-closing valves with inherent protection, the requirements of ISO 17879:2017(E) (IBR, *see* § 171.7 of this subchapter) shall be met until further notice.

* * * * *

(l) * * *

(1) * * *

(iv) ISO 11119-4:2016(E) (IBR, *see* § 171.7 of this subchapter).

* * * * *

(o) * * *

(1) ISO 11114-1:2012(E) and 11114-1:2012/Amd 1:2017(E) (IBR, *see* § 171.7 of this subchapter).

* * * * *

46. In § 178.75, revise paragraph (d)(3) introductory text and add paragraphs (d)(3)(vi) through (ix) to read as follows:

§ 178.75 Specifications for MEGCs.

* * * * *

(d) * * *

(3) Each pressure receptacle of a MEGC must be of the same design type, seamless steel, or composite, and constructed and tested according to one of the following ISO standards, as appropriate:

* * * * *

(vi) ISO 11119-1:2012(E), Gas cylinders—Refillable composite gas cylinders and tubes—Design, construction and testing— Part 1: Hoop wrapped fibre reinforced composite gas cylinders and tubes up to 450 l (IBR, *see* § 171.7 of this subchapter).

(vii) ISO 11119-2:2012(E) and ISO 11119-2:2012/Amd.1:2014(E), Gas cylinders—Refillable composite gas cylinders and tubes—Design, construction and testing—Part 2: Fully wrapped fibre reinforced composite gas cylinders and tubes up to 450 l with load-sharing metal liners (both IBR, *see* § 171.7 of this subchapter).

(viii) ISO 11119-3:2013(E) Gas cylinders— Refillable composite gas cylinders and tubes—Design, construction and testing—Part 3: Fully wrapped fibre reinforced composite gas cylinders and tubes up to 450 l with non-load-sharing metallic or non-metallic liners (IBR, *see* § 171.7 of this subchapter).

(ix) ISO 11119-4:2016(E) Gas cylinders — Refillable composite gas cylinders — Design, construction and testing — Part 4: Fully wrapped fibre reinforced composite gas cylinders up to 150 l with load-sharing welded metallic liners (IBR, *see* § 171.7 of this subchapter).

* * * * *

47. In § 178.275, revise paragraph (i)(2)(i)(A) to read as follows:

§ 178.275 Specification for UN Portable Tanks intended for the transportation of liquid and solid hazardous materials.

* * * * *

(i) * * *

(2) * * *

(i) * * *

(A) To determine the total required capacity of the relief devices, which must be regarded as being the sum of the individual capacities of all the contributing devices, the following formula must be used:

$$Q = 12.4 \frac{FA^{0.82}}{LC} \sqrt{\frac{ZT}{M}}$$

Where:

Q = minimum required rate of discharge in cubic meters of air per second (m^3/s) at conditions: 1 bar and 0 °C (273 °K);

F = for uninsulated shells: 1; for insulated shells: $U(649-t)/13.6$ but in no case, is less than 0.25

Where:

U = heat transfer coefficient of the insulation, in $kW m^{-2}K^{-1}$, at 38 °C (100 °F); and t = actual temperature of the hazardous material during filling (in °C) or when this temperature is unknown, let t = 15 °C (59 °F). The value of F given in this paragraph (i)(2)(i)(A) for insulated shells may only be used if the insulation is in conformance with paragraph (i)(2)(iv) of this section;

A = total external surface area of shell in square meters;

Z = the gas compressibility factor in the accumulating condition (when this factor is unknown, let Z equal 1.0);

T = absolute temperature in Kelvin (°C + 273) above the pressure relief devices in the accumulating condition;

L = the latent heat of vaporization of the liquid, in kJ/kg, in the accumulating condition;

M = molecular weight of the hazardous material.

* * * *

48. In § 178.505, redesignate paragraphs (b)(6) and (7) as paragraphs (b)(7) and (8), respectively, and add new paragraph (b)(6) to read as follows:

§ 178.505 Standards for aluminum drums.

* * * *

(b) * *

(6) If materials used for body, heads, closures, and fittings are not compatible with the contents to be transported, suitable internal protective coatings or treatments must be applied. These coatings or treatments must retain their protective properties under normal conditions of transport.

* * * * *

49. In § 178.506, redesignate paragraphs (b)(6) and (7) as paragraphs (b)(7) and (8), respectively, and add new paragraph (b)(6) to read as follows:

§ 178.506 Standards for metal drums other than steel or aluminum.

* * * * *

(b) * * *

(6) If materials used for body, heads, closures, and fittings are not compatible with the contents to be transported, suitable internal protective coatings or treatments must be applied. These coatings or treatments must retain their protective properties under normal conditions of transport.

* * * * *

50. In § 178.609, revise paragraph (g) to read as follows:

§ 178.609 Test requirements for packagings for infectious substances.

* * * * *

(g) Where packaging is intended to contain dry ice, an additional drop test to that specified in paragraph (d), and when appropriate, paragraph (e) or (f) of this section must be performed on one sample in one of the orientations described in paragraph (d)(1) or (2) of this section, as appropriate, which is most likely to result in failure of the packaging. The sample must be stored so that all the dry ice dissipates prior to being subjected to the drop test.

* * * * *

51. In § 178.703, revise paragraphs (b)(6) introductory text and (b)(7)(iv) to read as follows:

§ 178.703 Marking of IBCs.

* * * * *

(b) * * *

(6) For each composite IBC, the inner receptacle must be marked with at least the following information as required by paragraphs (b)(6)(i) and (ii) of this section.

Additionally, the marking must be visible while inside of the outer receptacle. If the marking is not visible from the outer receptacle, the marking must be duplicated on the outer receptacle and include an indication that the marking applies to the inner receptacle.

* * * * *

(7) * * *

(iv) For IBCs designed for stacking, the maximum permitted stacking load applicable when the IBC is in transportation must be displayed with the symbol. The mass in kilograms (kg) marked above the symbol must not exceed the load imposed during the design test, as indicated by the marking in paragraph (a)(1)(vii) of this section, divided by 1.8. The letters and numbers indicating the mass must be at least 12 mm (0.48 inches).

52. In § 178.705, revise paragraphs (c)(1)(iv) introductory text and (c)(1)(iv)(A) to read as follows:

§ 178.705 Standards for metal IBCs.

* * * * *

(c) * * *

(1) * * *

(iv) *Minimum wall thickness.* For metal IBCs with a capacity of more than 1500 liters, the minimum wall thickness must be determined as follows:

(A) For a reference steel having a product of $R_m \times A_o = 10,000$, where A_o is the minimum elongation (as a percentage) of the reference steel to be used on fracture under

tensile stress ($R_m \times A_o = 10,000 \times 145$; if tensile strength is in U.S. Standard units of pounds per square inch), the wall thickness must not be less than:

Table 1 to Paragraph (c)(1)(iv)(A)—Wall thickness (T) in mm, Capacity (C) in liters			
Types 11A, 11B, 11N		Types 21A, 21B, 21N, 31A, 31B, 31N	
Unprotected	Protected	Unprotected	Protected
$T = C/2000 + 1.5$	$T = C/2000 + 1.0$	$T = C/1000 + 1.0$	$T = C/2000 + 1.5$

* * * *

PART 180—CONTINUING QUALIFICATION AND MAINTENANCE OF PACKAGINGS

53. The authority citation for part 180 continues to read as follows:

Authority: 49 U.S.C. 5101–5128; 49 CFR 1.81 and 1.97.

54. In § 180.207, revise paragraph (d)(3) and add paragraph (d)(7) to read as follows:

§ 180.207 Requirements for requalification of UN pressure receptacles.

* * * *

(d) * *

(3) Dissolved acetylene UN cylinders: Each dissolved acetylene cylinder must be requalified in accordance with ISO 10462:2013(E) (IBR, *see* § 171.7 of this subchapter). A cylinder previously requalified in accordance with the second edition of ISO 10462(E) up until December 31, 2018, may continue to be used until the next required requalification. The porous mass and the shell must be requalified no sooner than 3 years, 6 months, from the date of manufacture. Thereafter, subsequent requalifications of the porous mass and shell must be performed at least once every ten years.

* * * *

(7) UN cylinder bundles: UN cylinder bundles containing compressed, liquefied, and dissolved gas must be inspected and tested in accordance with ISO 20475:2018(E) (IBR, *see* § 171.7 of this subchapter).

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